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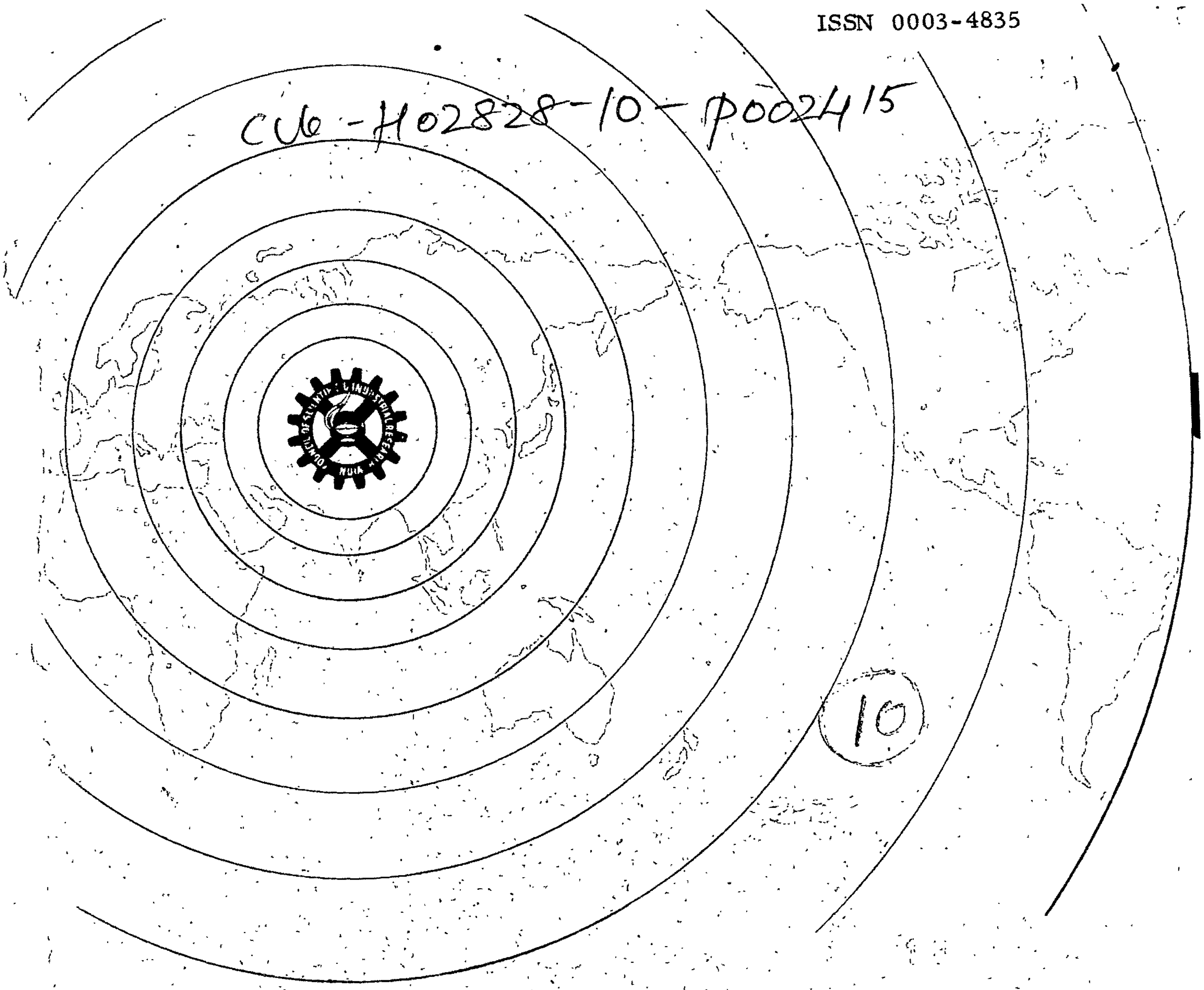

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CONTENTS

Pages

The Second World Book Fair, New Delhi, 1976 1-4

NEELAMEGHAN (A)
Development Science Information System (DEVSIS) 5-23

KAMATH (V A)
Information Systems in the Field of Nuclear Science and Technology, with special reference to Library and Information Services of BARC and its role in the Development of Atomic Energy for Peaceful Purposes in India 24-44

BOSE (P C)
Agricultural Information Systems 45-47

PARIKH (Kirit S)
Information System for Agricultural Sector 48-86

PHADNIS (S P), ABU SHOAIB AHSAN
Indian Agricultural Data and Information 87-98

SONAVANE (N K), AMBLE (V N)
Towards the Evolution of an Information System for National Water Resources Evaluation, Development, Management and Planning 99-104

KRISHNA RAO (D)
Climatological Information for National Development 105-108

SANYAL (R K)
Developing a National Information System in the Fields of Health, Medicine and Family Planning 109-122

DABRAL (C), BHAT (M K)
Towards Evolving a National Information System in Health and Medical Sciences 123-128

RAJAGOPALAN (T S)
Branch Information System 129-140

RAIZADA (A S)
Development of Computer-based Information Services in India 141-148

RAJAN (T N)
Manpower Development for Information Work 149-155

THE SECOND WORLD BOOK FAIR, New Delhi, 1976

As promised in the previous issue of the Annals, the present issue contains the remaining papers of the Seminar on Towards the Evolution of Information System for National Development held in December 1975. But, in the meantime has come the Second World Book Fair, which need be reported in the pages of the Annals. A brief report of it is presented here.

The Second World Book Fair once again attracted a large number of librarians, publishers, distributors, authors and book lovers to New Delhi. For those of us who are connected with the world of books the new year could have started hardly in a better way than useful participation in the Fair.

The Fair was organised by the National Book Trust of India in the spacious Hall of Nations pavilion on the international fair grounds in New Delhi. Even though the Fair was open for just ten days only, from 16 to 25 January 1976, it attracted more than 150,000 visitors. Daily attendance was more than 10,000 on an average. Thirtyseven eminent publishers from 19 foreign countries participated in the Fair. The countries represented were the USSR, UK, USA, Federal Republic of Germany, German Democratic Republic, Czechoslovakia, Singapore, Yugoslavia, Bulgaria, France, Nepal, Malaysia, Kenya, Bangladesh, Sri Lanka, Holland, Iran, Afghanistan, and Iraq. Of these, ten countries arranged collective exhibits representing various publishers from their countries at their stalls.

So far as the Indian book trade is concerned, as many as 266 publishers and book distributors from all over country participated by displaying a rich variety of publications. A number of State Governments had also put up separate stalls. They were the States of Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Orissa, lishing, trends and tendencies in US, British and Indian publishing, publishing trends in the developing world, role of translation in world publishing, book publishing and the future of authorship, copyright in world perspective, new techniques in book production and communications, and so on.

Some aspects of the librarian's point of view regarding the topics of the Seminar was very effectively brought out by Shri B. S. Kesavan. The theme of his paper was changing demand of the world library system on world publishing. He pointed out that librarians have been conducting readers' surveys from time to time to get a feel of the prevailing curiosities of the reading public meant to enlighten book selection committees and educationists. Publishers, on the other hand, have hardly ever felt the need for such surveys. It was even doubtful if at any time, anywhere, publishers as a body, or as individuals sat down to a study of the findings of such surveys as a guide for their publishing programmes. Such study might channel publishers to seek out rewarding avenues of publishing.

Shri Kesavan also dwelt, in passing, on the remarkable adjustment and adaptation the book publishing and libraries in general have shown with changing environment. It is well known that Shri Kesavan's language and style of saying even the simplest of things is inimitable. Even the best efforts in trying to re-tell or translate him may result in only something like presenting a veiled beauty. The real beauty can be seen and appreciated through his own words only. Hence, he need be quoted. On the changes in book publishing, he said, "Even as the older army Battalions burnished with created plume and cuirass, breast plate, shining spear, and scimitars in jewelled scabbards gave place to khaki platoons somewhat monotonous of the present day, book publishing struggled out of extravagant format, glorious illustrations, marbled edges, embellished spines, gold fluting, etc., and gave us the pocket book ... Even as human societies have evolved by breaking down the privileges, enabling 'The man in the street' to have access to knowledge, even so book production has kept pace in helping to achieve the apotheosis of the common man".

Recalling the corresponding changes in the library Shri Kesavan said, "Gone were those tall, towering buildings, up whose flights of steps you had to climb and enter a vast hall, walking gingerly and stilling your heart-beat, lest you disturb the quiet surroundings! Gone were those minatory notices shouting 'Hush' and 'Silence'! The library was no longer the privilege of only the student and the research man at the higher levels. The conversation of men, women and children, and their laughter was heard in libraries. There is nothing menacing about modern libraries". All these may be common knowledge to many but Shri Kesavan's words make us realise even familiar things so intimately and so thoroughly.

As can be anticipated, the Seminar on World Publishing in the Eighties reiterated its faith in the role played by books and adopted a set of recommendations. The Seminar was convinced that "the book will always have its place, in spite of the increasing use of the audio-visual media. There is a conviction amongst bookmen that, instead of substituting, these media will be complementary to books, and may even help in their larger circulation". The total number of recommendations adopted were 28 and quite a few of them were addressed to international organisations like the Unesco, the Commonwealth Secretariat, the International Postal Union, World Bank, etc, government of the country, and the book industry itself.

One recommendation in the first category reads as follows: "Unesco and the Commonwealth Secretariat should continue to provide channels for interaction and exchange among book industry personnel and among authors, translators and librarians". Similarly another recommendation which the librarians have made at different forums is "The International

Postal Union should consider taking action to reduce postal rates, both for surface and air mail, for books".

The basic recommendation of the second category, that is, concerning governments, reads as follows: "The Charter of the Book adopted for International Book Year at the instance of Unesco should be adopted by all member states, since it sets out, in very precise terms, the unique position which books occupy in society and outlines the principles which should guide those engaged in the promotion of books, so as to enable them to play their vital role in promoting the well-being of individuals and nations". Another recommendation, the like of which has been suggested by librarians on a number of occasions, reads, "Public and school library systems should be established or strengthened as components of a national library system, with particular emphasis on libraries for children, village libraries and mobile libraries".

Many more recommendations are of our interest, but all of them cannot be reproduced here. Trying to take stock of what the Book Fair and the Seminar have achieved, a few points inevitably come$ out. The organisation of the Fair was surely an assignment calling for initiative and ability of the highest order and the National Book Trust proved quite equal to it. Organisation of book fairs has been taken up by the Trust as a part of the broad movement to foster book-mindedness among the people. It must be granted that this has been achieved to a large measure. Those who have read about the rich and colourful German book fairs of the bygone days must have created in mind a fantasy about book fairs. The present Fair must have come very close to this fantasy for many.

So far as the Indian book industry is concerned, the much talked about 'grim economics' of it was hardly in evidence. Perhaps, the grimness was displayed in a different way. It has been a favourite excuse of the Indian book trade that its market was severely restricted. The number of readers was few and their paying capacity still less. The Fair and the Seminar must have given the impression to many that there were potentially enthusiastic readers whose curiosities need be carefully analysed. The book distribution system also needs some re-thinking. Those who have been complaining of dull market must have been surprised at the brisk sales at the various stalls of distributors and the open book bazaar on all the ten days of the Fair. Librarians, as agents of the ultimate consumers, have been asking for certain services which have not been coming from the book distributors. All these will point out that there is a scope for creating a better book market in the country. It is believed that the effects of the Book Fair would be profound and far-reaching.

B Guha
Editor

DEVELOPMENT SCIENCE INFORMATION SYSTEM (DEVSIS)

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0 *Introduction*

In March this year, a Study Team consisting of some half a dozen persons began work at the ILO, Geneva, on a feasibility study for a global information system for the socio-economic development field. The system is called Development Science Information System (DEVSIS). The Study Team was assisted, from time to time, by specialists on specific aspects of the design of the system. The first version of the complete report of the team has just been released. It will be discussed at the DEVSIS Steering Committee meeting in Paris, 4-5 Dec 1975 and at an evaluatory meeting in West Berlin, 8-12 Dec 1975. The work of the Study Team and the thinking and actions preceding it can be viewed as an exercise in systems design and planning.

The major parameters generally considered in a system design are:

1. Establishing need for the proposed system
2. Overall scope of the system to meet the identified needs.
3. Analytical study of the system components
4. Organizational aspects
5. Environmental aspects
6. Economics of the system
7. Developmental programme
8. Steps for implementation of recommendations and plans

1 *Establishing Need For A System*

One may encounter a specific problem and then begin to search for a solution to it. On the other hand, there may be only a vague general notion of existence of the problem as experienced by persons involved in the field concerned. For instance, in the information field, experience may indicate that a certain community of users is not getting adequate access to the information they need. One might then investigate, say through surveys, identify the specific information needs and the inadequacies of existing systems to meet the needs. This could lead to improvements in existing systems, and their utilisations, or the designing of new systems adequate to meet the felt needs, such an exercise of a detailed survey of needs, inadequacy of existing system,, etc, as a preliminary to making a proposal for a system of global dimensions could be too costly and time-consuming, if practicable at all. However, it is useful to examine the expression of experiences and the premises that have been formulated over the years, orienting the thinking and actions of peoples, institutions and organizations to develop a global information system for the socio-economic field.

11 *Premises*

1. Peace and prosperity in the world requires the creation of a new economic and social order - something different from the present order marked by dichotomies, distinctions, and discriminations, of haves and havenots, rich and poor, advantaged and disadvantaged, privileged and underprivileged, developed and under-developed.

2 The creation of this new economic and social order depends on co-operative and collaborative action among nations, institutions and social groups of all kinds, so as to bring about the appropriate economic and social changes, reducing the gaps between cultures, between nations and between social groups.

3 Knowledge is the principal instrument of socio-economic change, and the sharing of knowledge (intellectual resources) could be an effective means of reducing and bridging the gaps in and between societies.

4 The capability for knowledge transfer and information handling is both the potential for change as well as the indicator of achievement in material wealth.

5 Modern transport and communication systems have shrunk distance and time such that actions and happenings at one point have their impact, echo, and reverberations across space and through time. Therefore, one needs a broad perspective transcending the local context, to the national and international context.

Based on these premises, there is a growing recognition of the need to create the systems, the institutions, and the instruments which would help the movement towards this new economic and social order given the environmental context just mentioned. Information systems constitute one such instrument.

The preliminary recommendations of the Study Team contains three brief notes based on the postulates that DEVSIS is justified on the grounds of

- international equity, that the system will permit the sharing of information on socio-economic fields in a way that will permit a more equitable distribution of organized human knowledge;

- immediate international needs, that there is a general recognition of the imperative for a new international economic and social order to cope with long-term and recurring development crises that have global impact.

12 *Reports Of the Sixties*

The recognition of the need for global intersectoral, interdisciplinary development information systems and programmes is not new. We are familiar with the Lester Pearson report [8], which placed general emphasis on information and technology transfer to the developing countries. The Graham Jones report [6] which is something of a continuation of the Pearson report, says:

> "Successful industrialization requires the provision of a whole range of supporting services to augment the technical and managerial competencies of individual enterprises. The services include technical information and library services; surveys of industrialization possibilities; technological, social, and economic feasibility studies; investment project studies; preproject planning; applied scientific research and pilot plan development, market research; layout, organization and productivity improvements; standards and specifications; testing laboratories and quality control; equipment services; technical trouble shooting; technical management consulting; and extension services."

Several pages of the report are devoted to technology transfer to developing countries.

The series of conferences on the application of science and technology for development in Asia [1], Africa, and Latin America, also emphasised the sharing of knowledge between nations. Sir Robert Jackson's study of the capacity of the United Nations [5] identified the need for the establishment of an information system for UN's own development activities as a priority need. The report points out: "The present UN structure for development cooperation contains three levels of activity: (i) the development level.... (ii) the executive level.... (iii) the field level.... All three levels play significant roles in economic and social development.... each substantive unit of the UN and some the Specialized Agencies plans and conducts its own programmes without significant references to the programmes of others". Following the report, the UN set up the Inter-Organisation Board for Information Systems. The setting up of a computer-based Current Register of Development Activities (CORE), is in progress.

The international symposium held in Berlin in November 1969, which was sponsored by the German Foundation for Developing Countries, made a strong recommendation for the establishment of development information clearing houses.

The comments and recommendations of the influential Conference Board, contained in its publication "Information technology: Some initial implications for decision makers" (1972), have now become common knowledge.

More recently, the Club of Rome, in its second report pointed out:

> "All contemporary experience points to the reality of an emerging world system in the widest sense which demands that all actions on major issues anywhere in the world be taken in a global context and with full consideration of multidisciplinary aspects. Moreover, due to the extended dynamics of the world system and the magnitude of current and future change, such actions have to be anticipatory so that adequate remedies can become operational before the crises evolve to their full scope and force. If actions are to be anticipatory and effective, they must be based on a supply of information which is as complete and accurate as it can be made to be".

Current Realities

If there had been, over the past decade, the recognition by influential bodies, particularly international and intergovernmental organizations, of the need for development information system of international dimensions, why then action to establish such a global system was not initiated until 1974? Of course, there have been in operation a few international abstracting and indexing services in the economic and social science fields; more recently computer readable data bases have also become available in these areas. Most of these are discipline oriented, not mission-oriented; they are inadequate in coverage and scope with respect to development information; and most of them are not based on the concept of global participation of countries.

The DEVSIS feasibility report describes several surveys which indicate that little is known about development literature produced in developing countries, or about the 'grey literature' (government documents, reports, memoranda etc) produced anywhere. A fairly high proportion of the development literature produced in developed countries is abstracted and indexed many times over, both by secondary services and by individual organisations. This is an unsatisfactory situation leading to wastage of resources on the one hand, and the persons concerned with development planning and policy making having no reliable access to the information which is of interest and value to them most, on the other.

Until recently, there has been little experience and very few models of global information systems in which there was voluntary international cooperative participation in the design, operation and utilization of an information network. The International Nuclear Information Systems (INIS, 1966-1970) is the first example of decentralized input--centralised processing--decentralized product utilization. Then came AGRIS (1971-75). And now DEVSIS. In the meanwhile, through the programmes and projects of UNISIST (Unesco-ICSU programme for a World Science Information System) experience has also been gained in systems interconnection, compatibility, and convertibility.

The successful operation of these cooperative international information systems has demonstrated that the application of the "territorial" formula ensures the sharing of responsibilities and costs among nations on an equitable basis. This helps to eliminate duplication and to increase comprehensiveness of coverage of relevant literature. Countries have a national interest in bringing their own literature under bibliographical control; and once this is done, to submit information about that literature to a Central Unit for processing and distribution adds only an incremental cost which governments are increasingly willing to pay in order to regularly obtain information from other organizations and other countries. Thus, the experience of INIS and AGRIS is indicative of the feasibility of developing a mechanism for meeting the identified user needs which has not been achieved with the existing systems.

14 *Genesis Of The Devsis Proposal*

141 *International Priorities*

One might also ask why the sequence INIS, AGRIS, DEVSIS in the chronology of development of global information systems. International initiatives depend on international priorities. INIS came first perhaps because the superpowers were looking for ways in which they could cooperate in the nuclear field and build up the trust and confidence that could lead to an eventual detente. AGRIS came next because of the importance of food to all mankind. Ultimately such decisions are taken by governments. Perhaps, governments will be moved to action by the concern over the protection of the environment or by the energy crisis. However, there is a strong plea that the next global information system should respond directly to the needs of the large international community of persons who are concerned with economic and social development, in planning and operating programmes, in evaluation and in research.

142 *Proposal For A Development Information System*

A plea and a proposal for a development information system are contained in a paper entitled "DEVSIS": A development science information system" by John E Woolston (Director, Information Sciences, IDRC, Ottawa), distributed in January 1974. He proposed that "an effort should be made to build a cooperative information system with decentralized input/output making use of the organizational and technical experience of INIS and AGRIS and founded on the principles of UNISIST". He also proposed a schedule of action and indicated the role of the International Development Research Centre (Canada) in the programme [9].

The proposal received encouraging response from different groups, and an international conference was convened in Ottawa in June 1974 to discuss the project. General recommendations about various aspects of the system and the formation of a Steering Committee and a Feasibility Study team were made.

The Steering Committee at its first meeting on 16-18 October 1974 in Paris, adopted the following Statement of General Purpose and Objectives of DEVSIS:

> "In the overall interest of providing equal access to information, the general purpose and objectives of DEVSIS should be:
>
> 1 (a) To improve access to economic and social development information to individuals and institutions, particularly in developing countries, and especially to those involved in the formulation and implementation of development activities in governments and intergovernmental organisazations.
>
> (b) To foster the building and utilization of national and international resources needed to meet this goal.
>
> (c) To improve coordination between the existing development information, including library facilities.
>
> 2 Within the overall concept of evolving a future oriented programme for economic and social development information of broad scope, an international development information system (DEVSIS) should be prepared, which would:
>
> (a) Provide information services to users working in the development field at the national and international governmental and non-governmental levels (including the academic community) in developing and developed countries;

(b) Be responsive to the expressed needs of its users, and, following reviews and evaluation, to adjust to effective needs within a constantly evolving world context;

(c) Be responsive to appropriate technological advances in communications and to interconnection with other related systems, and thus contribute to meeting the priority information needs for the establishment of a new international economic and social order (General Assembly Resolution 3201 S (VI).

3 DEVSIS should cover both published literature and unpublished documents and data. The system should be based on the concept of decentralized input, centralized merging, and decentralized output services; it should thereby help contribute to the development of adequate information infrastructure and resources at the national level.

4 DEVSIS should be managed within the United Nations System.

5 DEVSIS should be open to the participation of interested Member States, as well as of intergovernmental and non-governmental bodies concerned with problems of development.

6 DEVSIS should be developed within the conceptual framework of the UNISIST programme; its design should take into account the experience of other operational and experimental information, including library systems.

7 All countries should be encouraged to give consideration to development information as an important component in the formulation of both their national development policies and their national information policies.

Under the guidance of the Steering Committee a Study Team was set up which is responsible for developing the system design for DEVSIS. The team would also identify existing relevant activities and resources in both developing and developed countries; define technical aspects of the system, such as, scope, coverage, required outputs, input and processing procedures, etc; and examine the financial and legal requirements of DEVSIS and recommend alternative options for implementation.

In the first phase of its work the Study Team was made up mainly of individuals who have had direct or indirect experience with policy making, planning, and research; the members came from different countries and cultures. The preliminary recommendations regarding the categories of users, the scope, and organization of DEVSIS are briefly mentioned below.

2 *Scope Of The System*

21 *Responding to the Needs of Policy-Makers· Planners and Researchers*

211 *Potential Users*

The Study Team has tried to take into account the needs of

(a) Policy makers with respect to socio-economic development at governmental and non-governmental levels, nationally and internationally;

(b) Planners - strategic, tactical, operational - of socio-economic development projects and programmes, including formulation of social and economic indicators, forecasting; and pre-investment studies at various levels; techno-economic and social surveys, including the scanning of the socio-economic and socio-political environment; and assessment and performance evaluation of projects and programmes;

(c) Researchers and teachers of socio-economic development subjects and those involved in management of research projects and programmes;

(d) Financiers who provide resources and technical co-operation for development projects and programmes. Likewise those who provide consultancy and advisory services; and

(e) Personnel concerned with information analysis and products thereof and those who provide support service to the categories of users mentioned above.

212 *Information Needs*

The Study Team consensus is that these groups feel the following needs:

(1) To better understand the present status and trends in the economies and societies for which they are taking decision and making plans, and the implication of these trends for the future;

(2) To have access to information on programmes and projects closely related - in content and intent - to those on which they are working, in order to have the possibility of benefitting from the experience of others; in their country or elsewhere, and to effect coordination of efforts;

(3) To receive digested background information on major trends in development philosophy and experience, probably in the form of short, readable monographs (supported, where appropriate by synoptic tables, graphs and charts); and

(4) To know where to go to get specialized information, data and statistics when particular needs arise.

22 *Inferences*

Following a detailed discussion of these priority needs, the DEVSIS Study Team has drawn a number of conclusions.

221 *Organisation to capture unpublished information*

The first conclusion that may be drawn for the statement of priorities is that DEVSIS must place a special emphasis on the capture of unpublished information.

Further projections (item 1) and programme and project reports (item 2) often now exist only in the internal files of ministries, banks and other institutions. This has implication for the organisation of DEVSIS which must be able to demonstrate that an institution that participates by making its own unpublished information available will enjoy compensating benefits by having access to the contributions of other institutions.

222 *Access to full texts*

The second conclusion is that DEVSIS must contain a well organised sub-system for providing rapid access to the full texts of the documents that it records. Since unpublished documents are not available in libraries around the world, all such documents reported to DEVSIS must be copied on microfilms or microfiches and sets of these placed at all major output stations in the DEVSIS network.

223 *Indexing abstracting and data extraction*

The third conclusion that can be drawn is that entries in the DEVSIS file, especially those relating to pre-investment (including feasibility) studies and project reports, should be indexed in depth and, as far as possible, should be abstracted in such a way that key data are immediately available from the computer record.

224 *Methods of economic analysis and models*

The fourth conclusion is that there is a high-priority interest in the methods and models used for calculating the effects of development actions (and of any changes in the parameters used), and for predicting trends in various sectors and sub-sectors of global, regional and national economies. DEVSIS should be particularly hospitable to information about such methods and models and about the computer programmes that are available for carrying out the calculations. Such records should necessarily include a notation of the source and availability (and, where appropriate, the cost) of obtaining the documents or programmes.

225 *Information analysis services*

Future predictions (whether quantitative, as in tables or graphs, showing supply/demand relationships, or qualitative as in assessments of the changing content of educational programmes) and digests (which again may be either quantitative or qualitative) imply the investment of intellectual resources on a large scale. The professional staff (and, hence, the cost) is far greater than that needed for a basic DEVSIS service. The fifth conclusion is, however, that DEVSIS should aim – as soon as possible – to build a service for digesting material of various forms such as

- information digests
- statistics
- forecasts.

Meanwhile, DEVSIS can, from its first days, provide referral to the organisations that offer services in these areas.

226 *Links to other systems*

And the sixth conclusion is that DEVSIS itself cannot meet all the priority needs, but, where it does not, it should provide a means of access to other sources of information, public and private, benefitting from UNISIST's work on systems interconnection.

227 *National participation*

The seventh conclusion is that the DEVSIS programme must involve a strong component to foster the building of the necessary national information policies and national information infrastructures to support the users, to exploit the services that DEVSIS will provide, to identify the gaps in available information, and to motivate authorities to fill these gaps [7].

23 *Categories of information material*

The following categories of information material are proposed by the Study Team as candidates for admission to the DEVSIS data base:

1 Basic Economic and Social Information and Data

1.1 Basic information and data: international and national levels.

Statistical and other factual information and data relating to economic and social conditions and phenomena (such as, resources, production, consumption, distribution, trade, and other transactions) as applied to the entire world, to regions of the world, or to particular whole countries.

1.2 Basic information and data: sub-national levels.

Same as for 1.1 but as applied to particular localities and to sub-areas within a country.

1.3 Information on existing social and economic situations: international and national levels.

Descriptive accounts and studies on the economic, social, political, and legislative structures and of the causes for underdevelopment and of factors favouring development, as applied to the entire world, to regions of the world, and to particular whole countries.

1.4 Information on existing social and economic situations: sub-national levels.

Same as for 1.3, but as applied to particular localities and sub-areas within a country.

1.5 Forecasts on trends: international and national levels.

Papers on trends in economic, techno-economic and social conditions extrapolated into the future, as applied to the entire world, to regions of the world, and in particular whole countries.

1.6 Forecasts on trends: sub-national levels.

Same as for 1.5, but as applied to particular localities and sub-regions within a country.

2 *Theories Models and Methodologies*

2.1 Models, Methodologies, Tools, and Techniques of study.

Papers on socio-economic models, econometric models, development indicators, methodologies, tools, and techniques (including computer programs) helpful in forecasting, planning, and other development studies, and evaluations of these.

2.2 Theoretical studies: international and national levels.

Theoretical and similar studies and evaluation of such studies on economic and social development and development policy formulations as applied to the entire world, to regions of the world, and to particular whole countries.

2.3 Theoretical studies: sub-national levels.

Same as for 2.1 but as applied to particular localities and sub-regions within a country.

3 *Development Policy, Plans and Strategies*

3.1 Statements of development policy

Documents issued by international, regional, national and local authorities and organizations, banks, funding and investment agencies, and political parties, defining or explaining their policies in relation to the pursuit of development goals.

3.2 Plans

Official plan documents, descriptive accounts of plans and statements issued by international, regional, national, and local authorities and organizations, banks, funding and investment agencies and political parties, detailing their development plans, programmes, resources allocations, budgets, time target, etc.

3.3 Reviews and evaluations of development programmes

Official and non-official commentaries, reviews and evaluations of the policies, plans, and programmes (For individual projects sec 3.5).

4 *Studies on and for Development Tactics*

4.1 Pre-investment studies and their evaluation
Pre-investment studies (including feasibility studies and market survey) and their evaluations. for specific development projects.

4.2 Tools for pre-investment studies

Papers on econometric models and techniques (including computer programs) useful for the elaboration and evaluation of pre-investment studies (including feasibility studies).

4.3 Development resources (general)

Studies on the availability of resources for development at global, regional, national, and local levels.

4.4 Development resources (specific)

Studies identifying particular development resources, and guides and directories for such resources information.

4.5 Operational experience (general)

General reviews and evaluatory papers on experiences in implementing development projects and programmes, including managerial, financial, legislative and administrative aspects. Aspects of coordination of development activities; institutional arrangements and cooperation.

4.6 Operational experience (particular projects)

Descriptions and progress reports of particular development projects and programmes; reviews and evaluatory reports of experiences in particular projects, including managerial, financial, legislative, administrative, coordination and control experiences.

5 *Studies on Consequences of Development Efforts and Activities*

5.1 Economic impact: international and national levels

Analytical studies and interpretations of the economic impact of development policies, programmes, and projects, at the international, regional, and national levels.

5.2 Economic impact: sub-national levels

Analytical studies and interpretations of the economic impact of development policies, programmes, and projects, at local level and at the level of sub-areas within a country.

5.3 Social impact: international and national levels

Analytical studies and interpretations of the social impact (including political and cultural) of development policies, programmes, and projects, at the international, regional, and national levels.

5.4 Social impact: sub-national levels

Analytical studies and interpretations of the social impact (including political and cultural) of development policies, programmes, and projects at the local level and at the level of sub-areas within a country.

5.5 Evaluations

Evaluatory reports of the results and achievements of specific development strategies, programmes, and projects.

Exclusions: Information qualifying for admission to DEVSIS under any of the categories mentioned above would, nevertheless, be excluded if it

either (a) is trival or redundant;
or (b) contains exclusively technical information, even when such technical information has been collected for, or is a result of, particular development programmes or projects.

The admission of sectoral information (as opposed to non-sectoral or cross-sectoral information) may be limited to that defined as directly pertinent to the DEVSIS mission. The Study Team has drawn up a table of proposed limitations in regard to sectoral information for each category listed above.

The categories of information to be admitted and excluded from DEVSIS are now being checked with actual documents with a view to understand the problems of identification, and improve the definitions, categorization, etc.

24 *Devsis Files*

Information pertaining to development is found in many sectors and the existing information services covering some of the sectors may overlap with DEVSIS. Where this is identified, the recommendation is for close cooperation with those systems — if they are internationally based and providing comprehensive coverage — in order to draw clearer boundary lines between those systems and DEVSIS.

Need has also been felt to make a distinction between information generated in response to development mission, and the more aggregated information from other sectors which is also used by the decision maker. The Study Team has recommended that DEVSIS contain, to begin with, two data bases (File 1 and File 2). These files would form the basis for the major printed products of the system, namely, Devindex and Devprofile. The two files are made up respectively as follows:

(1) File 1 — A comprehensive file with bibliographic references, abstracts and extracted key data, which would include references to such materials as computer programs, feasibility studies, project evaluation reports, market studies, etc. The file should be an integrated file, but it should involve multiparameter indexing to permit effective retrieval of specific information; for example, by type of information, by form of presentation, by subject, by sector, by geographical region, etc. The scope criteria is intended to ensure that, as far as possible, this integrated file would reflect the priority needs that have been outlined. The scope criteria would apply to all types of information entered into this file. - (FILE 1)

(2) File 2 — A data file on specialized sources and services available in the world dealing with topics relevant to socio-economic development. This file would be constructed to facilitate referral of enquiries to appropriate other sources and services.

25 *Language*

Estimate of the quantity of literature produced and used in the developing world — Asia, Africa, Latin America — indicates that the major languages which DEVSIS will have to handle are: English, Spanish, French, and Arabic. To begin with, DEVSIS would be hospitable to English, Spanish and French. In due course, capability for computer processing of Arabic characters would be developed.

26 *Products/Services*

The principal outputs are expected to be available on magnetic tape as well as in printed form: Devindex, the main bibliography of current development literature, with indexes; and the file on magnetic tape. It is recognised that users in developing countries often face difficulties in having access to documents. The Central Unit will, therefore, maintain a microfiche back-up file for all documents and reports not restricted by copyright law, and copies of documents can be obtained from this file. Participating centres can use DEVSIS output (on magnetic tape, printed form, and on microfiche) to produce specialized products and services for their own user communities. For example, bibliographies on specific subjects, SDI service, area bibliography, etc.

3 *Analytical Study of System Components*

The technical aspects of the data base, of the information processing, and of the output have been considered in some depth and detail by the Study Team. Experience gained with other global systems and the specialised characteristics of DEVSIS have been taken into account. Giving details of the recommendations here would amount to reproducing a good part of the feasibility study report! I shall only mention the titles of the chapters in the report which deal with the technical aspects.

Section B : Technical Aspects: The Bibliographic File (File One)

Chapter 11 : The DEVSIS record

12 : Parameters for indexing and retrieval

13 : The Creation of the File

14 : Outputs from the DEVSIS Central Unit

15 : Full-text service from the DEVSIS Central Unit

16 : Outputs from participating centres

17 : The DEVSIS Network

Section C : Technical Aspects : The Referral File (File Two)

Chapter 18 : A centralized operation

19 : Content and format of the referral file

4 *Organizational Aspects*

The institutional framework of DEVSIS should be established to ensure the participation of:

- the producers of the information that will be sought for the DEVSIS data base;
- the major users of the information that will be provided from the DEVSIS data base.

The institutions likely to be involved include international and regional organisations concerned with development, national governments, banks and other organisations financing development investments, public and private foundations, and research institutions.

We need also to envisage the possibility that DEVSIS may be financed by a consortium of organisations, and that the organisations providing resources — financial or otherwise — will seek a voice in the governing of the system.

The question then is — how can all these institutions best be brought together in one network?

There is clearly a need for the kind of mechanisms that only the United Nations system can provide, particularly:

- mechanisms for communicating with government and enlisting the participation of governments;
- mechanisms for providing long-term financing according to a formula of fair distribution of costs to governments;
- mechanisms for enlisting the necessary political and public interest, for example, by resolutions of the Economic and Social Council and the General Assembly of the UN;
- mechanisms for associating DEVSIS with other major international information programmes.

One of the working groups at the Third Session of the DEVSIS Steering Committee in July last, considered global organisation and financing of the System. While accepting that it would be premature to specify a long-term solution for the management of DEVSIS, the Working Group noted the desirability of eventually incorporating DEVSIS within the regular programme and budget of an appropriate agency; given the present structures, the most interesting candidates would be:

(a) an agency with broad responsibilities for economic and social development. At present this could be the UN Department of Economic and Social Affairs (ESA), or the UNDP. If the report of the Group of 25 is implemented, it could be the proposed UN Development Authority (UNDA).

(b) an agency with broad responsibilities for information programmes. At present this would be Unesco with particular reference to its UNISIST activities which are now being expanded into the economic and social sciences.

(c) an agency with the appropriate personnel and equipment resources acting on behalf of the UN system as a whole. At present this could be, for example, the ILO making use of the facilities of ICC.

(d) an inter-agency body with general responsibilities for information systems; at present this would be the IOB, but it is put at the end of this list because such a solution would be placing the activity at one step more removed from direct control by Member States.

The Working Group noted that there was interest in the secretariates of ESA, Unesco and ILO for possible future responsibilities for DEVSIS.

For the policy-making body, the Study Team recommends the creation of a Governing Board with broad representation, including sponsoring agencies as well as representation, on the basis of geographic regions, of participants providing input to the system as well as users.

The DEVSIS concept necessarily involves the production of a central file. It may be produced by merging any number of regional or national inputs, but there must be a central operations unit to handle the physical production of the comprehensive file. Technical skills and a computer capability must be available at the central operations unit. An arrangement like that of AGRIS may be possible — with the secretariat and management functions carried on in one organisation and the computer processing in another.

In reviewing the management functions of the Central Secretariat, particular emphasis is placed on providing support to the technical and financial advisory bodies, on network support and on cooperation with other international information systems.

5 *Environmental Aspects: Supporting Programmes*

In order to ensure smooth technical functioning of the system various standards, manuals, guidelines, authority lists, indexing, vocabulary control tools, etc are essential. The existing tools, particularly the ISO, and UNISIST formulations and used in other international information systems have been taken into account. Wherever found necessary, programmes and projects for development of new tools or for improving existing ones have been suggested and/or initiated.

The role of participating national centres and guidelines for selecting such centres have been outlined. The programmatic role of regional centres with respect to areas where national information infrastructures are yet to develop has been identified. Recognizing the need to keep abreast of developments in information processing and computing technology especially in regard to input devices and small scale computers, the DEVSIS would make available to the national centres a body of knowledge and advice developed centrally and regionally when making decisions about choice of computer hardware and software.

6 *Economics of the System*

Based on past experiences of operating global information systems of a pattern similar to the one proposed for DEVSIS, estimates of staff required to perform the various tasks and some of the cost elements are given in the sections dealing with technical aspects of the system. When DEVSIS goes into operation, may be three years from now, more experience would have gained with the interim organizational model (See Sec 7), the number of likely participating centres would be known more accurately, and information on the extent of usefulness, efficiency and economy of input and processing devices, such as the OCR equipment now being experimented with, would be available. There may also be other information technology developments which may prove useful to incorporate in DEVSIS. Some of these features would necessitate revision of the cost of operating the system. Here, we are considering mainly the cost of operating the Central Unit, the Central Secretariat and the services they provide. It will be remembered that the cost of making inputs to the system would be shared by the participating centres in different countries. The report indicates only the facilities required for national and regional centres, because the cost and the staff will vary with the volume of material to be processed, the facility and equipment already available and the size and interests of the user community.

7 *Development Programme and Implementation Schedule*

The ultimate objective is to get DEVSIS incorporated into the programme and budget of a UN organization. (The location of the Central Unit in a developing country is not also ruled out). But considering the nature of the cycle of movement of proposals, such as that of DEVSIS in UN bodies, and the budgeting process, it may be three to six years before DEVSIS becomes fully operational as an integral programme of the UN system. For the interim period, an organisational model which would locate DEVSIS Central Unit within a UN organization and also provide useful experience and opportunity to study a little more realistically the implementation of the various suggestions and recommendations, and user reactions, three options have been considered: The UN Department of Economic and Social Affairs (using the computer facilities and technical resources of IAEA), Unesco (using its own computer facility or that of ICC in Geneva), or the International Labour Organization (using the computer facility of ICC).

The cost of the three-year programme may come to $ 1.6 to $ 2.0 millions depending upon which components of the system are put into operation first, and the rate of development of the system. The rate of development would be influenced by the number of national participating centres involved during the three-year period. The financial estimate includes support for planning national participation.

Several alternative sources for the extra-budgetary finance of the interim operation have been considered: e. g. UNDP support for a global project, funding through a trust or a consortium established by several interested organizations, or a combination of these.

The jobs to be done during the period to enable the start of regular production cycles are defined and the staff required to these jobs is also identified. The phasing of these jobs in various combinations to provide a number of operational options, at different costs, during the interim period, is delineated.

8 *Conclusion*

The objectives of DEVSIS are broad and laudable in that the achievement of the objectives would help the establishment of the new economic and social order. Right from the beginning the system has placed emphasis on service to developing countries, and on effective national and regional participation, particularly of the developing world, in the development and operation of the system. DEVSIS would also collaborate with other international bodies such as UNESCO and regional institutions in building up strong national information infrastructure which, in turn, would contribute to an efficient and effective operation and utilization of DEVSIS in the long run. The standards and guidelines for information handling and systems interconnection developed under UNISIST auspices would be utilized in DEVSIS.

The characteristics of DEVSIS operational model would be similar to that of INIS and AGRIS. However, there are a few differences. Some of these are presented below.

Comparison of some Features of INIS, AGRIS, and DEVSIS

Feature	INIS (1971-)	AGRIS (1975-)	DEVSIS (proposed)
of subjects covered	Nuclear science, and technology — hard sciences ; interdisciplinary, but fairly well defined	Agriculture and allied fields—interdisciplinary, but less well defined than nuclear science and technology	Economic and social development—a large part soft science; cross-sectoral, and more interdisciplinary and less well defined than agriculture
2 Orientation	Serves predominantly research workers, engineers and technologists	Serves predominantly research workers, teachers, and to some extent, agricultural development planners, governments	To serve predominantly policymakers, planners, financiers, researchers, and information analysts concerned with socio-economic development at all levels, particularly in developing countries.
3 Types of documents covered	Books, articles, reports, theses, etc, mostly produced by research workers, engineers and technologists	Similar to that of INIS	In addition to books, articles, theses, etc greater emphasis placed on capturing the unpublished literature, such as project reports, pre-investment reports, administrative reports, etc.
4 Major part of the input from	A few developed countries	About 60 per cent from developed countries ; about 40 per cent from developing countries at present	Mainly from developing countries ; specified type of information from developed countries.
5 Language	Predominantly English as the carrier language. French and Russian versions of INIS thesaurus produced	Predominantly English as the carrier language. Problems of using other languages may arise in due course	English, French, and Spanish proposed as carrier language to begin with; Arabic may be next in line.
6 Terminology of the field	Fairly well defined technical terminology	Less rigorous than for nuclear science	Much less exact than in nuclear sciencet and agriculture. Often difficult to find one-to-one equivalents for terms in different languages. Words often carry connotation which reflect the predominant social philosophy of the society in which they are used.
7 Universality of concepts/ideas	Concepts are fairly universal.	Less universality of concepts than in nuclear science	Much less universality; the economic, cultural, and demographic environment—affects the universality of ideas.
8 Output products and services	Mainly list of references (Atomindex) ; microfiche doc back-up	Level 1 : List of references (Agrindex) Level 2 : Specialised subject services: abstracts, digests, etc. (proposed)	List of references with abstract and referra service, initially (Devindex) Listings for a region may be provided. Digests, compilation, information analysis, and synthesis, forecasts, etc, in due course Microfiche document back up.
9 Data base (computer files)	Mainly citations; inclusion of abstracts under consideration	Mainly citations	To include abstracts for the documents in the computer file A computer-readable inventory or information sources in the field, including computer software packages availability information.
10 Input communicating medium	Magnetic tape, paper tape, worksheet	Magnetic tape, paper tape, worksheet	(To be decided)
11 Number of items processed per year	About 70,000	About 250,000 ultimately	100,000–200,000 (?)
12 Number of input centres	About 40 at present	Mainly CAIN, CAB, a few regional centres and national centres at present	May be over 100.

P2415

13	Dispersal of information generating centres	In each country concentrated in a few centres	In each country dispersed in several institutions and projects	In each country, dispersed in a large number of institutions and projects.
14	Organization	Decentralized input-centralised processing-and decentralised input use	Similar to that of INIS	Similar to that of INIS. Strong emphasis of participation of regional centres.
15	Cooporating/cosponsoring bodies	IAEA, governments	FAO, governments, regional centres	A UN body, governments, intergovernmental organization, financing institutions (?).
16	Feasibility study to service time lag	1968–71, about 3·5 years	1971–75, about 4·5 years	1975 — ?

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INFORMATION SYSTEMS IN THE FIELD OF NUCLEAR SCIENCE AND TECHNOLOGY, WITH SPECIAL REFERENCE TO LIBRARY AND INFORMATION SERVICES OF BARC AND ITS ROLE IN THE DEVELOPMENT OF ATOMIC ENERGY FOR PEACEFUL PURPOSES IN INDIA

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1 *INTRODUCTION*

11 Man's technological advance has been in proportion to his ability to extract energy from his environment and convert it to productive purposes. The history of energy sources is characterized by the constant replacement of one energy source by another; new and better fuels have come into use before resources of existing fuels were depleted. Wood was largely replaced by coal and hydro-power towards the end of the 19th century and more recently, by oil and natural gas.

12 A new source of energy of incalculable constructive as well as destructive potentialities was discovered in 1939 by O. Hahn & F. Strassmann when they bombarded uranium with neutrons which resulted in the fission of uranium-235 atoms and release of energy. The convertibility of mass to energy in accordance with Einstein's famous equation $E = mc^2$ was thereby proved and a new source of power became available to the world at a time when the first twinges of anxiety about the adequacy of other energy resources were being felt. The atomic age dawned on December 2, 1942 when E. Fermi, in a squash-court at the University of Chicago, U.S.A., triggered off the first ever self-sustaining nuclear chain reaction and controlled it. The first atomic power station supplying electricity for industrial purposes was built in the U.S.S.R. and put into commission on July 27, 1954.

13 The constructive atom has already opened the flood gates of economic prosperity and scientific and technological progress undreamt of before. The ever-increasing number of atomic power stations springing up all over the world, extensive use of radioisotopes - one of the offshoots of atomic energy - in agriculture, industry, biology, medicine and research, bringing forth with it immense benefits to mankind, and many other applications are some of the examples of the constructive potentialities of the atom. By the end of 1974, 154 atomic power stations were operating in the world producing 54,743 MW(e) of electricity.

2 *ATOMIC ENERGY IN INDIA*

21 India was one of the first countries to enter the nuclear field, credit for which goes to the late Dr. Homi Jehangir Bhabha, the first Chairman of India's Atomic Energy Commission (AEC), who, with his dynamism, foresight, scientific talent and unbounded energy, not only firmly built the infrastructure of nuclear research and development, but also made India one of the leading countries of the world in the nuclear field.

22 India's atomic energy programme is wholly devoted to peaceful applications of atomic energy, such as production of electricity through atomic power stations, building research reactors for research in various scientific fields and production of radioisotopes for a variety of applications and the peaceful uses of nuclear explosions.

23 The progress in the nuclear field in India can be broadly traced through three phases. The first phase, extending upto 1956, emphasised the training of scientists and the creation of scientific groups under the leadership of competent scientists who could, with appropriate facilities and considerable freedom of work, produce excellent work and develop the basic expertise. The Tata Institute of Fundamental Research, Bombay, has played a significant role in this phase. The second phase, extending upto 1964, saw the development of the know-how and technologies. It marked the growth of the Atomic Energy Establishment at Trombay as the national centre for research and development work in various disciplines of nuclear science and technology. The third phase sees the utilisation of the knowledge and expertise acquired for the economic development of the country through atomic power projects and public sector industries based on the technology developed at Trombay and the other units of the Department of Atomic Energy (DAE). The national centre for research and development in the nuclear field was established at Trombay in accordance with the decision of the AEC taken on January 3, 1954 and was formally inaugurated by the late Prime Minister, Jawaharlal Nehru, on January 20, 1957. It was renamed as Bhabha Atomic Research Centre (BARC) on January 12, 1967, in memory of Dr. Bhabha. The Centre is one of the largest of its kind in the world with a staff of about 10,000 of whom some 3000 are scientists and engineers.

24 India's progress in the atomic field has been very impressive. Appendix VI gives various atomic energy establishments in the country. It is not intended to dwell at length on our achievements in this field, in this paper. It is noteworthy that already our achievements have started contributing to the development of our national economy. Electricity from two atomic power stations, namely, Tarapur and Rajasthan, has been flowing into the regional grids. A large variety of radioisotopes are being produced and used in agriculture, industry, medicine and so on, and are also exported. Expertise and technical know-how gained in various areas such as electronics, heavy water, nuclear materials etc. are being used to set up large-scale industrial plants. The Library & Information Services of BARC, by promptly supplying all the available information and data to the scientists and engineers,

needed in their research and development work, through its documentation, information and other services, has certainly played a vital role in all these achievements.

3 IMPORTANCE OF NUCLEAR INFORMATION AND DOCUMENTATION SERVICE

31 It is almost an axiom that an effective information and documentation service is indispensable for scientific research to keep abreast of the rapid developments taking place all over the world. The service should be speedy and efficient to save the researchers' time. The advances in the nuclear field have been extremely rapid with the result that 85, 000-90, 000 publications such as journal articles, conference papers, technical reports, theses, patents, books etc. falling within the broad discipline of nuclear science and technology appear every year and this number is increasing exponentially. Nuclear Science Abstracts, the most comprehensive abstracting journal in the field, listed only 2, 500 items in 1948, the first year of its publication and 66, 236 items in 1974 - nearly 25 times that number. The total number of scientific and technical publications to-day itself is conservatively estimated at 2. 5 million !

4 INFORMATION SYSTEMS IN THE FIELD OF NUCLEAR SCIENCE AND TECHNOLOGY

41 The crucial importance of atomic energy prompted many advanced countries to set up their own information systems in the field at an early stage. By the middle of the nineteen sixties, a number of abstracting and indexing journals, fully or partly devoted to nuclear science and technology, existed in the world. The following are the most representative among them:

Nuclear Science Abstracts
Chemical Abstracts
Biological Abstracts
Index Medicus
Isotope Titles
La Propriete nucleaire - Brevatome,
Le Bulletin signaletique de CNRS, ser. Physique;
  Chimie et technologie nucleaires
Index de la litterature nucleaire française
Physics Abstracts
Referativnyj Zhurnal, ser. Fizika; Khimiya;
  Biofizika, Radiatsionnaya Fizika, etc.

42 Among the large national information systems covering nuclear science and technology, are the following :

(1) Technical Information Program, United States Energy Research and Development Administration.(USERDA), Oak Ridge, U. S. A.

(2) Central Research Institute for Information, Technical and Economic Studies on Nuclear Science and Technology, Moscow, U. S. S. R.

(3) Le Service de Documentation, Centre d'Etudes Nucleaires de Saclay, Commissariat a Lenergie Atomique (CEA), France.

(4) Zentralstelle fur Atomkernergie Documentation (ZAED), Karlsruhe, Federal Republic of Germany.

(5) Division of Technical Information, Japan Atomic Energy Research Institute (JAERI), Tokai, Japan.

(6) Library & Information Services, Atomic Energy Research Establishment. (AERE), Harwell, United Kingdom.

43 The Euratom Nuclear Documentation System (ENDS) of the Centre for Documentation (CID), European Atomic Energy Community. (Euratom), Luxembourg, is the largest computer-based information system in the nuclear field in the world. Operational since 1967, its nuclear data base consisting of over 1.5 million items covering the period 1947-1972 has been built up from Nuclear Science Abstracts and items selected from about 100 abstracting periodicals. The System now contains INIS data base also. It provides reprospective searches and SDI services.

431 Apart from the work of developing automatic documentation system, the CID publishes directly or in co-operation with outside bodies, a number of scientific and technical publications which are listed below :

(1) Euratom reports containing the information yielded by Euratom's research programme.

(2) Euratom Information - multi-lingual monthly periodical which gives the brief summaries of published Euratom reports, the subject matter of contracts signed and patents granted and the main lines of the research programme adopted by the Commission.

(3) Euratom Bulletin - A quarterly periodical aimed at keeping a wider public informed of the Euratom's activity in the atoms-for-peace field.

(4) Transatom Bulletin - a monthly periodical which lists the translations (into English or into Community languages) of documents of nuclear interest published in the more remote languages (Russian, Japanese etc.).

(5) Nuclear Medicine - a monthly edition of EXCERPTA MEDICA, published in co-operation with Euratom.

44. The only truly international information system in the field of nuclear science and technology is the International Nuclear Information System (INIS) established by the International Atomic Energy Agency (IAEA) in Vienna, Austria, in April 1970. Because of its great importance, the System is dealt with in some details later in this paper. The United States nuclear information system, which is the most comprehensive of its kind in world to-day, is also described briefly.

45 U.S. Nuclear Information System : The United States Atomic Energy Commission, now known as U.S. Energy Research and Development Administration (USERDA), an agency of the U.S. Government established in 1947 with major responsibilities for research, development and production in the field of nuclear energy, has since its inception operated a comprehensive nuclear information system to support its own research programmes and to meet its responsibility for the dissemination of nuclear information to the population at large. The System has been centered at the Technical Information Centre in Oak Ridge with major information activities located in the multi-purpose national laboratories and has provided effective control of and access to the technical, research and development reports produced in the AEC programmes; it has provided extensive abstracting and indexing services covering the world's scientific and technical literature from the specialist view point of nuclear science and technology. Its semi-monthly abstracting journal 'Nuclear Science Abstracts (NSA)' is the principal medium for the dissemination of bibliographic information and is the most comprehensive abstracting journal in the field. The subject scope and other details of USERDA's Technical Information Programme and NSA are given in Appendix II and III.

451 An interactive computer retrieval net-work called AEC/RECON has been used since 1970 as the principal information retrieval programme. The System was originally developed by Lockheed's Palo Alto Research Laboratory for NASA. RECON systems are now in use by many Government agencies in the U.S. The European Space Research Organisation operates a RECON system in Europe.

452 The technical information base is now broadened to cover all energy-related research and development. There are now over 450,000 items on nuclear science and technology at TIC accessible by computer.

46 International Nuclear Information System (INIS) : In order to meet adequately its statutory obligations to foster the exchange of nuclear information amongst its Members, the International Atomic Energy Agency proposed the creation of the International Nuclear Information System. The proposal was approved by the Board of Governors and subsequently by the General Conference of the IAEA. INIS was established in Vienna, Austria, and became operational in April 1970.

461 The main objective of INIS is to improve and expedite exchange of nuclear information among nations of the world on the basis of multi-lateral cooperation and to avoid wasteful duplication of efforts in the field. It also aims at meeting the information needs of the developing countries and helping them to train their scientific and technical personnel, thus establishing an adequate infra-structure for their work in the peaceful uses of atomic energy. It is essentially a mission-oriented information system covering more or less the entire field of nuclear science and technology. INIS subject scope is given in the Appendix IV. The uniquęness of INIS lies in its document backup service which, unlike other information systems, makes available all the non-conventional literature inputted to it through its Clearinghouse.

462 INIS has amply demonstrated the UNISIST concept whose ultimate goal is the establishment of a flexible and loosely connected net-work of information systems based on voluntary cooperation. UNISIST is concerned initially with basic sciences, applied sciences, engineering and technology, but will be later extended to other fields of knowledge - all such systems forming its sub-systems. INIS seeks to interface with these sub-systems in an effort to interchange or exchange input or output products. This calls for a high degree of compatibility, as inputting is a decentralised operation. In view of this, INIS lays strong emphasis on maximum possible computerisation for both input control and retrieval. This means that the participating Members are responsible for collecting, procuring and preparing the input of all items failing within the INIS subject scope published in their countries in the standard machine-readable form readily acceptable for computer processing. The INIS Section at Vienna acts as the co-ordinating body and as a processing centre for checking and merging the inputs received. Various operations involved in this process are indicated in the INIS work-flow chart given in the Appendix V. The following are the various INIS output products:

463 INIS Atomindex: This is a computer-produced bibliography issued semi-monthly, both in magnetic tape format and its printed version, containing bibliographic descriptions and descriptors for all items reported to INIS. The references, including English and original language titles, are grouped by subject and listed alphabetically by author within each subject category. Each issue includes a personal author index, a report number index, an index of corporate entries and a subject index. Cumulative indexes are issued twice a year. For publishing this journal, an IBM-370/145 computer and Linotron-505 computer-controlled photo-composition equipment are used. From January 1976, Atomindex will contain the abstracts also and will thus become a full-fledged computer-produced international abstracting journal in the field of nuclear sciene and technology. With the publication of this journal, Nuclear Science Abstracts is most likely to cease publication. An experimental issue of the journal was brought out in September this year. Table 1 gives nuclear literature coverage by NSA and Atomindex during the period 1970-1975.

Table 1

Coverage of Nuclear Science Literature by
NSA and INIS Atomindex - A Comparative Study

Year	NSA	INIS Atomindex	Remarks
1970	53080	4053	First year of INIS Atomindex
1971	60298	10425	Annual rate of growth was maintained at 100% or more
1972	60848	20862	
1973	62137	56757	
1974	66236	63669	Almost catching up with NSA
1975(Oct. end)	57535	51607	

464 Abstracts on Microfiche : Every item reported to INIS is accompanied by an abstract, in one or more of the official languages of the Agency (English, French, Russian and Spanish), but usually in English. These are issued in microfiche form only and are numbered and sequenced according to their corresponding citations in the INIS Atomindex. This service will cease from January 1976.

465 Non-conventional Literature on Microfiche : About 25% of all the items reported to INIS relate to non-conventional literature e. g. reports, conference preprints, patents, theses etc. Full copies of these are made available, against payment, on microfiche only.

466 INIS Reference Series : This is a set of documents containing the rules, standards, formats, codes, authority lists etc. on which the System is based. These currently consist of 15 documents. They are in accord with the existing and developing international standards to ensure the widest compatibility.

467 Presently, 45 Member States and 13 international and regional organisations are participating in INIS. The INIS Data Bank contains now some 2, 14, 000 items. The largest contributor to the Bank is the United States - about 40%. The other major contributors are the USSR, the UK, the Netherlands, the Federal Republic of Germany, Japan, France and India. India ranks 8th among the major contributors to INIS and about 2% of the INIS data bank consists of Indian items. In 1974, some 63, 700 items were inputted to the System. The number of items produced in the world at present falling within the INIS subject scope is estimated at 85, 000 – 90, 000.

468 INIS was created in a spirit of international co-operation and continues as a co-operative venture for the benefit of all countries. This is the first international, decentralised, computer-based information system which provides scientific and technical information on atomic energy to users on international scale, with a broader coverage and higher precision and

speed than is possible in a purely national system, and with minimum expense at the national level. The success of INIS will no doubt prompt the setting up of similar international information systems. Already, the Food and Agriculture Organisation (FAO), in close collaboration with INIS and making full use of INIS expertise and software, has set up AGRIS (International Information System for Agricultural Science and Technology) which went into operation in January 1975. Yet another system called DEVSIS - international information system in the field of economic and social development - co-sponsored by IDRC, ILO, OECD, DESA, UNDP and UNESCO is under intensive study at present.

47 INSPEC service provided by the Institution of Electrical Engineers, U. K., offers internationally accepted completely integrated computerised services in the areas of physis, electro-technology, computers and control which has made possible: (1) computerised production of INSPEC abstract journals (2) a range of new services of magnetic tapes, SDI and archival files for on-line retrieval (3) a series of cooperative interconnection programmes.

5 LIBRARY & INFORMATION SERVICES OF THE BHABHA ATOMIC RESEARCH CENTRE

51 The planning and organisation of the Library & Information Services (L & IS) of the Bhabha Atomic Research Centre was done to achieve the following objectives: Initially, to meet the information needs of the Centre's scientists and engineers as fully and expeditiously as possible; later on, to extend its services to the sister institutions, organisations and projects under the Department of Atomic Energy and finally, to other institutions and organisations in the country so far as their information requirements in nuclear science and technology are concerned. The methods adopted are to be conventional, with the gradual introduction of computerisation to the extent desirable taking into consideration the availability of our vast manpower, including technically qualified one, and the obvious need for its utilisation. In other words, the computerisation should not result in any drastic reduction in the number of personnel already employed and required to be employed in the future, but it should improve the speed, accuracy and consistency of the services offered.

52 The philosophy underlying the planning of the L & IS is that it should be a completely integrated unit under a single administrative control to ensure its smooth and effective working to fulfil its basic objectives and functions, and should be equipped with the facilities needed to provide all services to meet the information needs of BARC's 50 scientific divisions and sections which have about 7000 scientific and technical personnel. The organisation chart of L & IS is given in Appendix VI.

6 LIBRARY

61 The Library complex consists of the Central Library, the Depository Library and the Divisional Libraries.

62 Central Library : This has now some 85, 000 books and bound volumes of journals covering all the scientific disciplines in which research and development work is carried on in the Centre and to this collection 5000 to 6000 new books and bound volumes are added every year. The Library subscribes to 1300 important technical and scientific journals in the nuclear and allied fields. Besides, 320 journals are received either gratis or on publications exchange basis. The Library facilities are made available for 12 hours a day and on all days except 16 holidays observed during the year.

62 Divisional Libraries : In addition to the Central Library, the Centre's scientific divisions have small libraries containing essentially books and other publications which are needed for day-to-day reference.

63 Depository Library : One of the most comprehensive libraries in the country and the only one of its kind,and one of the largest in the world in the nuclear field is the Depository Library comprising scientific and technical reports of various atomic energy organisations in the world, procured mainly on the basis of bilateral publications exchange agreements. These reports are both in full-size and microform i. e. microfiche, microcard and microfilm. The reports are made available, on request, to any institution or organisation on loan. In case there is a great demand for a particular report, Xerox copies of it are made and kept in the Library for loaning so that institutions or individuals requiring it need not have to wait for long. Every year some 35, 000 to 40, 000 new reports are added to the existing collection of about 350, 000. In view of the wealth of information contained in the report literature, which is extremely useful to the scientists in their work, a concerted effort is being made to procure from all known sources every significant report so as to make the Depository Library as complete a report literature collection as possible in respect of reports published in the field of nuclear science and technology.

64 Patents, Standards and Reprints Collection : This has some 25, 000 patents, standards and reprints of papers procured partly in response to specific requests from the Centre's scientists. On an average, 2, 000 new items are added annually to this collection.

65 Procurement Procedure : As the Library is research-oriented, the procedure adopted for the procurement of publications is as follows : the scientific divisions of the Centre have been grouped under seven Groups. Each Group has a Library Committee consisting of senior scientists. The recommendations for books, journals and other publications are made by these Committees which are considered by the Main Library Committee and expeditious action is taken on its

decisions. Any scientific worker, whatever may be his status, can make suggestions for the acquisition of books, journals or any other publication for the Library and these suggestions are implemented, if approved by the Main Library Committee. This is perhaps the most rational approach to the procurement of publications, as the Library thereby truly reflects the interests of practically every person in the Centre engaged in research and development work and meets his requirements.

66 Budget : The present annual budget for the procurement of books and journals is Rs. 12 lakhs. The budget is increased every year to meet the rising demands. Every effort is made to acquire the publications recommended with the maximum possible speed and after acquisition, the publications are quickly processed so as to make them available to the scientists with minimum delay.

67 The Library catalogues, routines and services are mainly of the conventional type. However, a detailed study has been made to see to what extent these could be computerised and a beginning has been made in computerisation.

68 Inter-Library Loan : With the object of utilising, as fully as possible, the nuclear literature existing in the libraries of various universities, national laboratories and scientific institutions and organisations in the country, an inter-library loan service was initiated in 1960 which makes it possible to get on loan material needed by our scientists which is not available in our Library. This is a reciprocal arrangement and our Library, on its part, loans publications required by other libraries on a short term basis.

681 Other libraries which have large collections of nuclear literature are those of Tata Institute of Fundamental Research, Bombay; Saha Institute of Nuclear Physics, Calcutta; Physical Research Laboratory, Ahmedabad; Bose Research Institute, Calcutta, and National Science Library, INSDOC, New Delhi.

682 Some other instituions and organisations having fairly good collections of publications in the nuclear field are: National Physical Laboratory, Delhi; National Chemical Laboratory, Poona; National Metallurgical Laboratory, Jamshedpur; Geological Survey of India, Calcutta; Indian Cancer Research Centre, Bombay; Indian Institute of Radiophysics and Electronics, Calcutta; Central Electronics Engineering Research Institute, Pilani; libraries of some of the universities and the Indian Institutes of Technology and the National Library, Calcutta.

7 DOCUMENTATION AND INFORMATION SERVICES

71 The L & IS offers practically all the services of a full-fledged documentation/information centre such as indexing, abstracting, current awareness services, SDI, compilation of subject bibliographies, retrospective searches, reprographic service, publications etc. and also participates in an international

information system, i.e. International Nuclear Information System. While most of the services are of conventional type, some are computer-based.

72 Among the conventional services are: (1) Current Awareness Service on Reactors - Part I and Nuclear and Neutron Physics - Part II (monthly) (2) Nuclear Information Bulletin (Quarterly) - This contains information on nuclear topics collected from various sources and grouped under convenient subject headings for quick reference.

73 Computer-based Services : It has been difficult to cope up with the ever-increasing demands of the users, with manual methods. It was, therefore, decided to computerise some of the services, within the framework of the policy of L & IS. Consequently, a Computer Unit was formed, with staff members having adequate training in computer programming and systems analysis, to identify the areas involving jobs of repetitive nature and clerical routines, for computerisation.

731 The present activities of the Computer Unit are : (a) development and use of a local IR system for the in-house computer facility (b) machine-readable input preparation for INIS and utilization of its output tapes (c) use of European Nuclear Documentation System (ENDS) for literature search, and (d) maintenance of a reference collection in the computer field.

732 A system called "Automation for Storage and Retrieval of Information (AFSARI)" has been developed for SDI service. It is also used to produce two current awareness services, namely, "Bibliography of Current Reports" (BCR) and "List of Additions", giving bibliographic data on reports and books added to the Library. The AFSARI system consists of several programmes written in COBOL language for the Honeywell-400 computer of the Centre's Computer Facility. The AFSARI system is used for SDI for the last one and half years. The SDI is at present limited to report literature received in the Depository Library, with some 75 user profiles. The user profile reflects the 'group' requirements for information rather than 'personal' ones. The SDI list in the form of a computer printout is sent to the user, along with a feed-back form. The user is requested to indicate his comments on the relevancy of the documents retrieved for his query. On receipt of his comments, his query profile is changed or modified for the next computer run.

733 The output tapes received from INIS can be used for SDI services, retrospective searches, subject bibliographies etc. Due to non-availability of a compatible computer, the output tape processing has not been done so far. However, the benefits of INIS output tape service are given to the Centre's scientists through our participation in European Nuclear Documentation System (ENDS), Luxembourg. ENDS has been developed by the Centre for Information and Documentation (CID) of the Commission of the European Communities and has been operational since 1967. The System has some 1.5 million documents in its data base which includes all Nuclear Science Abstracts from 1948 to

1972 and the INIS Atomindex. It is one of the very few centres in the world where almost a 'complete' nuclear data base is available. The L & IS utilizes the System's 'literature search' service by sending it requests from BARC scientists for specific literature search and normally, within 2 to 3 weeks the output containing the bibliographic description, along with photocopies of abstracts, is received from ENDS. It is then sent to the scientists concerned and in return, the duly filled-in feed-back study forms indicating the relevancy of documents retrieved, are sent to ENDS. Presently, 30 user profiles are maintained and on each search of INIS Atomindex, computer printouts of references and photocopies of their abstracts are received.

734 Apart from the books and periodicals available in the Library on computerized information processing, the Computer Unit maintains a large collection of reprints, Xerox copies of articles and a few reference manuals in the field. The collection covers various aspects of computerized information processing, working and experimental systems, descriptions of some systems and standard tape services and their utilization.

74 Translation Services: The publication of a substantial proportion of nuclear literature (about 40%) in languages other than English, makes it imperative that such literature be made available to our scientists. An appreciable number of our scientists do possess an adequate knowledge of one or more of the languages: French, German and Russian while very few know other European languages and Japanese. Although the Russian scientific literature is being translated into English on a fairly large scale, particularly in the United States, still a good part of it remains untranslated. Besides, there is a considerable time-lag between the publication of the Russian papers, reports etc. and the availability of their translations.

741 With a view to providing expeditiously the English translation of important non-English nuclear literature to our scientists, a Translation Unit was set up at the very inception of our nuclear programme. This Unit at present has six language experts handling mainly French, German, Italian, Rumanian, Russian and Japanese.

742 An irregular publication entitled 'Translation Bulletin' is brought out for internal circulation which gives bibliographic data on the papers, reports etc. which are fully translated by the Translation Unit. On an average, about 300 papers, reports, etc. are translated every year.

75 Technical Publications: The Publication Unit is responsible for editing, printing and distributing BARC technical reports, proceedings of symposia, conferences etc. held under the auspices of the DAE and BARC and other technical publications such as lecture notes on specific subjects, brochures etc. In-house Xerox, offset, letter-press and binding facilities are used for

this purpose. The reports fall broadly under three categories, namely, : (1) restricted reports which are circulated only to a few individuals in the Centre. (2) reports meant primarily for circulation within the Centre and sister institutions under the DAE, and (3) reports both for internal and external circulation. On an average, 130 to 150 publications of all categories are brought out every year. Besides, over 400 papers are published annually in both Indian and foreign journals, presented at national and international conferences, symposia, seminars etc. The reports are brought out as speedily as possible and sent to various atomic energy organisations in the world on bilateral publications exchange basis, and also national laboratories, scientific organisations and universities in the country.

76 Technical Information : There is considerable interest in and enthusiasm for atomic energy and its manifold applications among the educated masses, particularly students and teachers, as reflected by scores of queries received by the L & IS. The Information Unit handles all such queries and makes available pamphlets, brochures and other publications on our atomic energy programme to stimulate the interest. Queries received from foreign countries about Indian atomic energy programme are also handled by this Unit.

77 Reprography : The Reprographic Unit consists mainly of Xerox machines, both imported and indigenous ones. This Unit, in conjunction with the Offset-printing Unit, is used for the production of various BARC publications. The Unit also has a Rank Xerox/1824 Printer and a 3 M Reader/Printer for producing full-size copies from microfiches and microfilms requested by the scientists. Besides, there are several microfiche, microfilm and microcard readers.

78 Micrography : There is a Kodak MRD-2 microfilming camera and microfiche making equipment supplied by the Atlantic Microfilm Corporation, USA, which are used for microfilming documents and also preparing microfiches of BARC publications.

8 *INIS OPERATION IN INDIA*

81 In conformity with her policy of supporting any venture aimed at fostering international co-operation, India was one of the first countries to join INIS and has been since actively participating in it. As the national inputting centre for INIS, the L & IS is responsible for all INIS operations in the country. From the very outset, 'Operation INIS' was systematically planned and executed. Important tasks undertaken during this operation can be summarised as follows:

i) Identifying and collecting nuclear science literature produced in the country.

ii) Selecting and processing the material thus collected in a systematic manner for preparing the input for transmission to the INIS Section in Vienna on a regular basis.

iii) Developing professional competence for preparing the input in machine-readable form.

iv) Organising speedy dissemination of merged input data by generating useful by-products.

82 For achieving these objectives, an INIS Cell of experienced documentalists with sound scientific background was set up. This Cell undertook the study of the INIS system and conducted a survey of the available sources of nuclear literature in the country. Subsequently, a small working group, namely, INIS Group of subject and documentation specialists was formed, two of whom also possessed a good knowledge of information processing by computer. Incidentally, the first INIS seminar 'Regional Seminar for Asia and the Far East on Input Preparation for INIS' was held in BARC from November 23 to December 11, 1970 and it proved very useful in providing the basic training to the members of the INIS Group in all aspects of input preparation. Besides this general training, two members of the INIS Group were deputed for 'on-the-job training' in Vienna for 4 to 6 months. As a part of this training, the members were also given an opportunity to visit some important nuclear information centres in Europe and the U.K. During the course of the training, the members attended the INIS Training Seminars held in Vienna and Karlsruhe on various aspects of INIS.

83 We began sending input on worksheets. However, since June 1972, after the acquisition of a Friden flexowriter Model 2303-I, the input has been prepared on paper tape in machine-readable form. From October 1975, INIS planned to incorporate machine-readable abstracts on output tapes. Consequently, inputting centres have been asked to supply the abstracts in machine-readable form viz. on magnetic tape or paper tape or OCR mode. Our abstracts are now sent on paper tape as the input data is also being sent in this form.

84 According to an estimate, some 1,500 - 1,800 documents falling within the INIS subject scope now originate in India annually. Of the journal papers, over 70% are published abroad and therefore cannot form part of the Indian input for INIS. We endeavour to collect and input as much of the nuclear literature published in the country as possible. The average annual input by India so far is about 2% of the total world input to the INIS Data Bank and is probably more than the inputs from all other developing countries put together. The following Table gives India's input to INIS till Nov. 1975:

Table 2

INDIA'S INPUT TO INIS DATA BANK

Year	Indian Input (Cumulative)	Total world input (Cumulative)	% of input from India in INIS Data Bank
1970	151	4,053	3.7%
1971	386	14,478	2.6%
1972	1000	35,340	2.8%
1973	2230	92,097	2.8%
1974	2980	1,55,765	1.9%
1975 (upto Nov.)	3900	2,14,000	1.8%

85 We utilize the output products distributed by INIS by subscribing to 10 air-mailed copies of Atomindex, plus 2 copies received free of charge, and abstracts on microfiche of all the items. The printed Atomindex is widely circulated among our scientists for speedy dissemination of information. Non-conventional literature available in microfiche from the INIS Clearinghouse is procured in response to individual requests. However, on account of the non-availability of a compatible computer in BARC, for that matter in the Bombay region, it has not been possible so far to utilise the INIS magnetic tape for starting services such as SDI, retrospective literature search etc.

Library & Information Services of BARC, which is a need-based mission-oriented information system, is characterised by its comprehensiveness, dynamism and sound organisation, and is the most unique of its kind in the country. Among the main factors which enabled L & IS to attain its present status are: (1) sound and realistic planning (2) hard and dedicated work put in by the members of its staff (3) environment of research and development activities of BARC and (4) active participation in its activities by the Centre's scientists. L & IS is now looking forward to active participation in the National Information System for Science and Technology (NISSAT).

APPENDIX II

U. S. Energy Research and
Development Administration (USERDA)
Division of Technical Information Extension (DTIE)
Technical Information Program
Oak Ridge, Tennessee, U. S. A.

Date Established	1946
Description of System	The TECHNICAL INFORMATION PROGRAM is a centralized documentation center for the USERDA and as such it collects, catalogs, abstracts, indexes and disseminates information in

	the field of nuclear science and technology. It also provides reference, literature searching, publication and microfiche services.
Subject Coverage	Nuclear and nuclear-related information.
Input Sources	Journals, technical reports, USERDA engineering materials, books, theses, monographs, patents, translations, and conference literature from world-wide sources.
Serial Publications	Nuclear Science Abstracts (semi-monthly); Technical Progress Reviews (quarterly); Isotopes and Radiation Technology, Nuclear Safety, Reactor Technology.
Non-serial Publications	The following publications are issued irregularly: Engineering Materials List (TID-4100) Standard Distribution for Unclassified Scientific and Technical Reports (TID-4500); Index to Conferences Relating to Nuclear Science (TID-4043); Report Number Codes Used by the USERDA Division of Technical Information in Cataloging Reports (TID-85); Corporate Author Headings Used by the USERDA (TID-5059); USERDA Translation Lists; Subject Headings Used by the DTIE (TID-5001); Publication Exchanges of the USERDA (TID-4554); Bibliographies and research and development in progress, e. g., Controlled Fusion and Plasma Research (TID-3557); Bibliography on Nuclear Medicine (TID-3319); Research and development in progress, e. g., Summaries of the USERDA Basic Research Program in Chemistry; (TID-4051); Research and Development of Progress - Biology and Medicine (TID-4060); Serial Titles Cited in Nuclear Science Abstracts (TID-4579).
Microform Services	USERDA and other U. S. agencies' technical reports are available in microfiche form to the public from National Technical Information Service.
Other Services	Abstracting and indexing; card service (Limited to ERDA contractors); computer and manual literature searching; consulting; cooperative programs; copying; depository program for selected libraries that purchase microfiche; microreproduction; reference and referral services; research; systems analysis and design; translation.
User Restrictions	Information contained in USERDA technical reports and announced in NSA are within the public domain.

U. S. Energy Research and
Development Administration (USERDA)
Division of Technical Information Extension(DTIE)
Oak Ridge, Tennessee, U. S. A.

Date Established	Publication of Nuclear Science Abstracts began in 1948.
Description of System or Service	NUCLEAR SCIENCE ABSTRACTS (NSA) began in 1948 as a semi-monthly publication of the U. S. Atomic Energy Commission. It provides abstracting and indexing coverage of the world's literature in the fields of nuclear science and technology. The literature included is indexed by subject heading-modifier combination and descriptors.
Subject Coverage	Nuclear science and technology.
Input Sources	Theses, reports, conference papers and proceedings, books, and articles from over 2,000 scientific journals.
Serial Publications	Nuclear Science Abstracts (semi-monthly) - available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Non-serial Publications	Subject Scope of Nuclear Science Abstracts (TID-4552) Corporate Author Headings Used by the U. S. Atomic Energy Commission in Cataloging Reports (TID-5059) Subject Headings Used by the USAEC, Division of Technical Information (TID-5001); Report Number Codes Used by the USAEC, Division of Technical Information in Cataloging Reports; Descriptive Cataloging Guide (TID-4577) Subject Modifier Guide, Manual for Composing Section (TID-4578) Guide to Abstracting for Nuclear Science Abstracts (TID-4576) Serial Titles Cited in Nuclear Science Abstracts (TID-4579).
Magnetic Tape Services	Subject heading-modifier indexes have been computer stored since 1962, descriptor indexing since 1968. Both files are machine searchable for information retrieval.
Other Services	Abstracting and indexing; computer and manual literature searching; reference and referral services; translation; consulting.
User Restrictions	Service is available to any subscriber.

APPENDIX IV

INIS SUBJECT SCOPE

PHYSICAL SCIENCE

General Physics: mathematical and general theoretical physics; atomic and molecular physics; solid-state and fluid physics; plasma physics and thermonuclear reactions; astrophysics and cosmology, cosmic radiation; direct energy conversion; low-temperature physics

High Energy Physics: elementary particles (theory); elementary particles (experimental)

Neutron and Nuclear Physics: neutron physics; radiation physics; nuclear theory; nuclear properties and reactions

CHEMISTRY, MATERIALS AND EARTH SCIENCES

Chemistry: chemical and isotopic analysis; inorganic, organic and physical chemistry; radiochemistry and nuclear chemistry; radiation chemistry; corrosion; fuel processing and reprocessing

Materials: metals and alloys (production and fabrication); metals and alloys (physical properties and structure); ceramics and cermets; other materials; radiation effects on physical properties of materials

Earth Sciences: land; water; atmosphere

LIFE SCIENCES

All Effects and Various Aspects of External Radiation in Biology: effects of external radiation on biochemicals, and on cell and tissue cultures; effects of external radiation on microorganisms; effects of external radiation on plants; effects of external radiation on animals; effects of external radiation on man

Radionuclide Effects and Kinetics: tissue distribution, metabolism, toxicology and removal of radionuclides; radionuclide ecology

Tracer Studies in Life Sciences: novel tracer techniques

Applied Life Sciences: plant cultivation and breeding; pest and disease control; food protection and preservation; animal husbandry; other applications of radiations and radioisotopes in life sciences

Health, Safety and Environment: actual radiation accidents; radiation hazards and safety evaluations of nuclear installations; radiation protection standards; radiation protection procedures; personnel dosimetry and monitoring

ISOTOPES, ISOTOPE AND RADIATION APPLICATIONS

Isotopes and Radiation Sources: production of enriched uranium; production of heavy water; other isotope production, separation and enrichment; radiation sources; radiation source metrology

Isotope and Radiation Applications: power production; industrial applications, radiometric; industrial applications, radiation processing; tracer techniques

ENGINEERING AND TECHNOLOGY

Engineering: thermodynamics and fluid flow; cryogenics; structures and equipment; nuclear explosions; handling of radioactive materials; accelerators (whether for particle research or not); materials testing

Nuclear Reactors (General): reactor theory and calculation; reactor components and accessories; reactor fuels; reactor control systems

Specific Reactor Types and Their Associated Plants: power reactors, non-breeding, light-water moderated, boiling water cooled (bwr etc. types); power reactors, non-breeding, light-water moderated, non-boiling water cooled (pwr etc. types); power reactors, non-breeding, graphite-moderated (gcr, agr, htgr etc. types); power reactors, non-breeding, otherwise moderated or unmoderated; power reactors, breeding; research and test reactors, including experimental reactors (zero-power reactors and subcritical assemblies) and training reactors; production reactors (producing fissionable materials), irradiation reactors such as chemonuclear reactors, isotope production reactors, tritium production reactors, materials testing reactors, material processing reactors; mobile, propulsion, transporatable and package reactors

Instrumentation: particle and radiation detection and measuring instruments and methods; other nuclear instrumentation and methods of measurement; radiation effects on instruments, components or electronic devices

Waste Management: waste treatment; waste disposal

OTHER ASPECTS OF NUCLEAR ENERGY

Economics: nuclear power economics; fuel cycle economics; economics of isotopes and radiation applications

Nuclear Law: radioactive materials; nuclear installations; radiation health; transport and storage of radioactive materials; liability for nuclear damage; nuclear ships and other nuclear means of conveyance; organization and administration of nuclear activities; nuclear disarmament and safeguards

Nuclear Documentation: data handling; literature handling

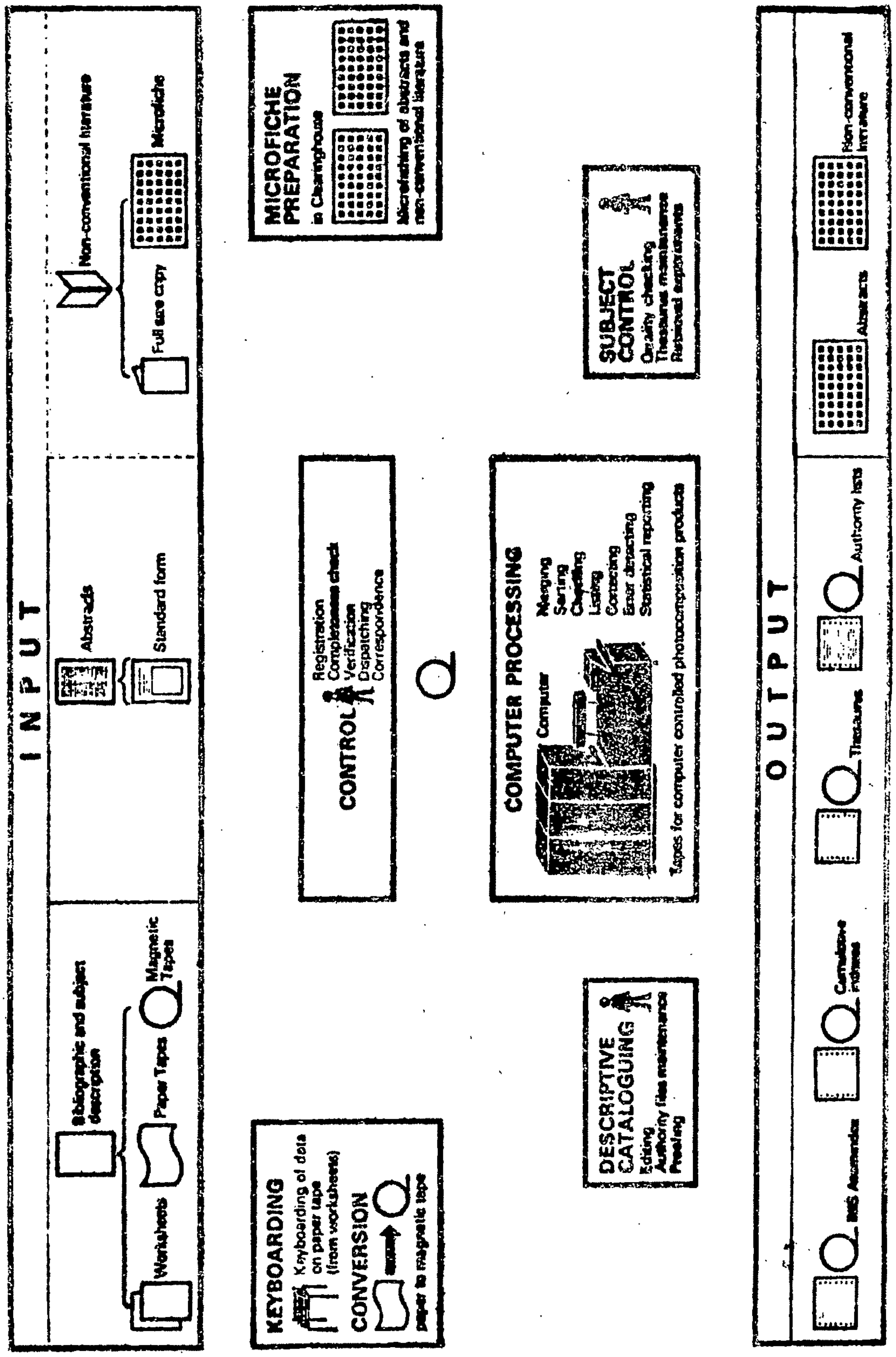
Safeguards and Inspection: technical aspects; non-technical aspects

Mathematical Methods and Computer Codes: nuclear computation and simulation

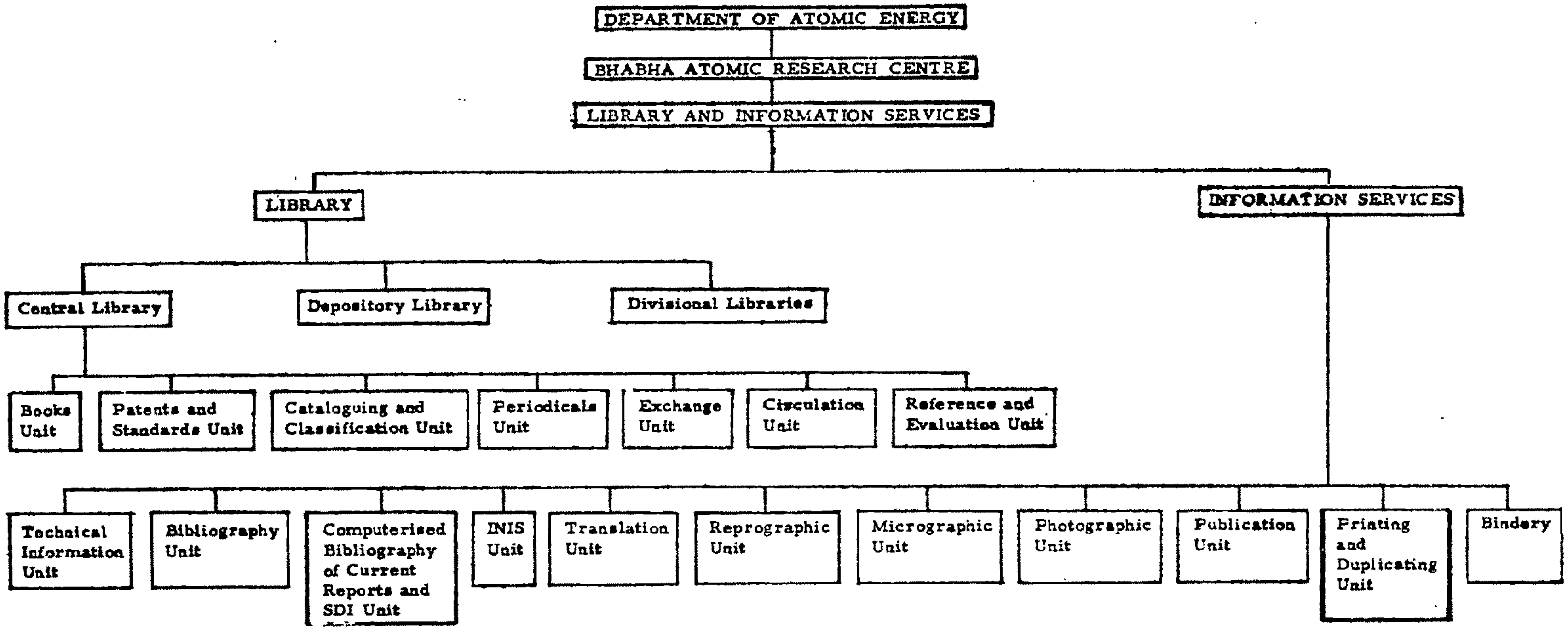
Miscellaneous: general relevant documents; progress reports

APPENDIX V

INIS FLOW CHART



APPENDIX VI


DEPARTMENT OF ATOMIC ENERGY
BHABHA ATOMIC RESEARCH CENTRE
LIBRARY AND INFORMATION SERVICES
LIBRARY
INFORMATION SERVICES
Central Library
Depository Library
Divisional Libraries
Books Unit
Patents and Standards Unit
Cataloguing and Classification Unit
Periodicals Unit
Exchange Unit
Circulation Unit
Reference and Evaluation Unit
Technical Information Unit
Bibliography Unit
Computerised Bibliography of Current Reports and SDI Unit
INIS Unit
Translation Unit
Reprographic Unit
Micrographic Unit
Photographic Unit
Publication Unit
Printing and Duplicating Unit
Bindery

ORGANISATION CHART OF LIBRARY AND INFORMATION SERVICES

AGRICULTURAL INFORMATION SYSTEMS

P. C. Bose

Indian Council of Agricultural Research,
New Delhi-1

0 *Introduction*

Advancement of Science and Technology has given rise to a proliferation of scientific literature and information and the same hold good for Agricultural Sciences & Technology. The sophisticated communication system and electronic data processing equipment have opened up new vistas in the field of information handling. As a result, several global information systems like INIS, AGRIS, CARIS and DEVSIS have emerged in recent years.

In the field of Agricultural Sciences, the FAO of United Nations came up with two global information systems and requested the member countries to cooperate in their venture. The Government of India took a decision in July 1974 to participate in the International Information System for Agricultural Sciences and Technology (AGRIS) at a national level through a National Input Centre under Indian Council of Agricultural Research. At the request of FAO the Government of India also decided to participate in the Current Agricultural Information System (CARIS) in September, 1975. The Indian Council of Agricultural Research strongly feels that in any National Information System, Agricultural Sciences and Technology should play a major role because it is so vital to the basic needs of the millions of people i. e. food and nutrition. Secondly, it has the largest infrastructure in Research and Development in the country with number of Research Institutes, Laboratories, Projects, Programmes, Agricultural Universities and Scientists. Thus the explosion of scientific literature and information in agriculture has outnumbered in any other field of Science in India..

1 *AGRIS - International Information System for Agricultural Sciences and Technology*

The AGRIS was conceived when a number of organisations providing or planning to provide information services in the field of food and agriculture approached the Director General of FAO in 1969 and requested him to sponsor a meeting of Experts to investigate what might be the possibilities and advantages of cooperation. The Expert body recommended that FAO should sponsor the development of an International Information System for Agricultural Sciences and organised at two levels.

AGRIS Level One is a cooperative, comprehensive and rapid current awareness service covering all the subject field of FAO's interest, with FAO acting as Coordinating agency.

Level Two is a network of services - grouped by subject field or mission including specialised information services, data banks and data handling services which would provide specific information through abstract services, intensive index and other form of specific and direct services to users.

The AGRIS 'Level One' is to provide all countries the comprehensive current awareness service in all fields of interest of FAO, consisting of a current bibliography in printed form and also on magnetic tape. The 'Level One' became operational in January, 1975 with the publication of monthly AGRINDEX. The AGRINDEX has broadly 150 subject headings and sub-headings. Each item has a unique reference number. The author's names are given first. The affiliation of first author is also cited thus enabling the user to identify the work and communicate directly with the author. The title is followed by the conventional information required to identify and describe the document: its language, a journal title, a report number, the place and date of publication and publishers, volume and issue number, number of pages, availability of original document in case of non-conventional literature. On the magnetic tape, all elements of description are 'tagged', making it possible to select, by computer, items by other facets than those displayed in the printed index.

The AGRIS System in more compatible to the International Nuclear Information System (INIS) of IAEA and the maintenance of AGRIS programme is being done at INIS Data base at Vienna. It is expected that the annual input of AGRIS will be 2, 50, 000 items per annum against 1, 00, 000 inputs of INIS.

The ICAR has started sending Indian inputs from May, 1975 for the AGRIS Data base at Vienna for publication in the AGRINDEX. At present about 150 items per month are being sent and it is expected that about 200 items will be sent from January next. The first Indian input appeared in the August, 1975 issue of AGRINDEX, Vol. 1(8) and India is one of the 15 Input Centres in the world which is submitting inputs to AGRIS Data Base. About 200 Indian Serials - cover to cover and core journals - have been selected for inclusion in the System besides non-conventional ones.

2 *CARIS - Current Agricultural Research Information System*

The CARIS project aims at establishing an international information system which would collect, organise and disseminate basic data on current research in the field of agriculture, animal production, forestry, inland fisheries and food and mainly on research institutions, research workers, programmes and activities carried out in or on behalf of the developing countries in order:

a) to improve communications between institutions and between scientists,

b) to assist in the evaluation of the adequacy of existing research effort, and the identification of major gaps and weaknesses, as an aid to decision making at both the national and international level.

It is not an abstracting service providing summaries of past results (this aspect will be covered by AGRIS) but a System aimed at providing and maintaining current awareness of what is going on in agricultural research, where and what resources, aimed primarily at assisting the developing countries, but also generally serving world agricultural development.

AGRICULTURAL INFORMATION SYSTEM

The global project is expected to collect information from some 1600 research institutions involving 7000 research workers, 8000 research lines and some 30,000 research projects.

In the initial stages, the project will be limited to the information concerning 1) research institutions, 2) research workers, and 3) main lines of research (or programmes).

The local CARIS Centre would be in charge of data collecting, indexing and processing and of disseminating of information, through services to users in their respective areas. CARIS Coordinating Centre would ensure the exchange of information on a world wide scale by merging information from local CARIS Centre.

The information system envisaged by CARIS project of FAO is already being carried out by the Research Project Unit of I.C.A.R. since 1967, which was established on the model of Current Research Information System (CRIS) of USDA. The Unit is responsible for collection, collation, indexing, documentation and dissemination of all on-going agricultural research projects in India. Both the FAO Projects - AGRIS and CARIS are being handled at a national level by the Research Project Unit of the Council till a full-fledged computerised Agricultural Research Information and Documentation Centre is established under I.C.A.R.

INFORMATION SYSTEM FOR AGRICULTURAL SECTOR

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Need for a Computerised Information System

1. The agricultural sector is the most important sector in India's economy as nearly 45 per cent of the GNP originates in this sector. Though it is a very traditional sector it has now become a sector in which technological progress in production techniques has become very rapid. More or less a continuous flow of new technology is coming out of the research and experimentation stations. For getting the best results, information on this new technology and its implications for production decisions and general agricultural policy should be made available to the concerned people as soon as possible.

2. Very few countries have been able to manage and develop the agricultural sector satisfactorily. This is due to a number of reasons. Firstly, conventional economic theories of development and planning concentrate largely on the industrial sector. Not much thought is given by academic economists to developing techniques of planning and managing the agricultural sector.

3. Secondly, the agricultural sector has a very large number of producers each with his own production possibility which is affected by the soil types, irrigation availability, and knowledge of the available technology w. r. t. seeds, fertilizer, pesticides etc. Moreover different crops can be grown from the same land. Any satisfactory considerations of this variability requires analysis of vast amount of data.

4. Thirdly, in many developing countries as in India the bulk of agriculture is dependent on weather (monsoon), variations in which affect significantly the production of food grains. The monsoon does not seem to follow any predictable pattern - atleast not one which can be discerned from 50-100 years' data. It becomes necessary to resort to a more extensive analysis to bring into considerations effects of unpredictable monsoon in policy making.

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5. All these involve vast amount of data, and data which have to be up-dated frequently. A large computerized information system is a necessary prerequisite before any satisfactory analysis can be made to manage the agricultural sector in a country such as India.

6. A computerized system is vital for yet another set of reasons. The data required for a successful management of the sector are collected by many different organizations. For example, the data on climate, rain and moisture availability and need are collected by the meteorological department. The data on areas devoted to different crops are collected by the Ministry of Agriculture. The information on yield response of different crops to different availability of water is likely to be available with the Indian Council of Agricultural Research. But the irrigation systems are operated by the irrigation department. Most often this is done without the benefit of the data available with other organizations. Optimal irrigation releases can make significant difference in the agricultural production. In determining optimal irrigation releases, data on all the above are required. A large central computerised information system can provide the data from many sources to the various operating agencies. However, not only such data are required, the data are required in time so that irrigation releases can be changed in response to changing cropping pattern and the unfolding behaviours of the monsoon. Such a responsive system can be made to work only in the context of a central computerised information system. At present in the operations of many irrigation systems the pattern of releases are based on cropping pattern which prevailed in the command area some years ago. This leads to grave inefficiencies in the use of irrigation water. as under the impact of new varieties cropping pattern change substantially from year to year.

7. Timely processing of large amount of data is also essential for improving the reliability of forecasts and hence policy which in real world has to be based on forecasts of coming events.

8. For example this year it was predicted by the meteorological department that the monsoon will be delayed by two weeks. The various state governments were warned and asked to take corrective actions; either to release more water from irrigation reservoirs during the normal sowing period, or to be ready for a second planting or to sow a different variety which can be sown late in the season.

9. Even in the analysis of past data, where timelines may not be crucial, the need to bring all data at a common place accessible to all is great. Today we have vast amount of data, collected at enormous expenditure, lying unprocessed or partially processed. These data would become even more valuable when processed together with data collected by different organisations.

10. For example, the climatological data from meteorological department can be used along with the experimental data collected under various programmes of the Indian Council of Agricultural Research (ICAR) to estimate production functions with climatic factors as explanatory variables along with seed variety, fertilizer dosages etc. Similarly the forecasts of agricultural production being attempted solely on climatological data by the meteorological department can be improved by using the yield production functions estimated from the various experiments.

11. As yet another example can be cited the question of evolving cropping patterns for arid zones. Based on climatological data, one can build up the profile of expected soil moisture availability for a given zone. This information can be used along with the production functions estimated from the ICAR experiments to select optimum cropping patterns for the zone.

12. Both the Institute of Agricultural Research Statistics (IARS) and the India Meteorological Department (IMD) plan to get computer systems of their own. These systems, however, will be fully employed in routine bulk data processing. It is thus necessary to establish a higher order computer centre to integrate the data coming from these and other organisations for effectively aiding policy in the agricultural sector. In fact, without such a central computerised system and the analysis that is made possible by it, full and effective use of the information generated by the IARS and IMD computer systems would not be possible. An integrated holistic view of agricultural planning would become possible only if such a system is established and made operational.

13. In fact, but for these computers and the small computers that are being planned by some state governments, it would be a near impossible task to build up the data base for a computerised information and management system. For then, the vast amount of data gathered by many primary agencies all over the country would not be available in machine readable form. To make these data machine readable would be an impossible task for a single organisation without unlimited resources.

14. The purpose of this report is to outline an up-to-date information system, and to show what can be done in this area with the help of such a system. We first identify the users of such a system and the objectives of Agricultural Policy and the decisions that various actors have to take in this sector. Next, we outline the various analytical frameworks relevant for taking these decisions. We will then survey the data sources, the channels and frequency of flow of data. Finally we will identify the various analyses that may be performed and decisions that may be taken better at different stages in the development of the system with available data and as data availability improves in the future. Finally we determine the computing power required for the system.

The Users of the Agricultural Information System

15. The Ministry of Agriculture is in the overall charge of Agricultural sector. However, the Planning Commission and the Ministry of Finance are involved in determining the size of its various programmes. The irrigation systems which were till recently managed by the Ministry of Irrigation and Power are now under the control of the Ministry of Agriculture. Under the constitution, agriculture is a state subject and the programmes are administered by the state governments. Important policy decisions have to be taken in consultation with the state governments. For example: The fixing of the procurement support prices of agricultural commodities is a very important annual issue between the central government and the state governments.

16. The performance of agriculture affects the operations of other ministries of the Government. The public food distribution system and other relief measures have to be operated by the Ministry of Civil Supplies. The extent of required imports of agricultural commodities affect foreign exchange budget and the national budget itself is affected by agricultural output.

17. The proposed agricultural information system would be used by these various ministries of the govt. of India. In the absence of such a system these decisions are, at present, based on the work of many inter-ministerial committees, and special study commissions. These groups have experts in the various areas and their judgement and expertise are brought to bear on the work of the committees. At this level the computerised information system can very effectively help in quantitative decision making and improve government policy in agriculture and areas affected by it.

18. On the other hand, the role that such a system can play at the farmer's level is also very large and by itself can justify such a system.

19. The farmers in India have tasted the fruits of the new technology of agriculture. They are now keen to adopt newer technologies almost as fast as they come out of the research stations. The extent to which farmers in India have adapted the new technology can be seen in the table below which show the growth in use of fertilizers, and High Yielding Varieties (HYV).

Year	Area under HYV ('000 Hectares)		Fertilizers Distributed ('000 Tons) ($N+P_2O_5+K_2O$)
	Paddy	Wheat	
1961-62			383
1962-63			478
1963-64			574
1964-65			653
1965-66			757
1966-67	888	541	1203
1967-68	1784	2958	1739
1968-69	2628	4793	1750
1969-70	4519	6100	1407
1970-71	5588	6480	1814
1971-72			2382
1972-73			2589
78-79 (Target)	16500	15000	8000

20. The numbers in the above table do not fully reflect farmers' willingness to adopt new technology as there are substantial excess demands for fertilizers and improved seeds. Inspite of the recent doubling of fertilizer prices, there is still a black market of fertilizers and a premium of 100 per cent or more is demanded and paid.

21. A computerised system which can provide to the cultivators upto-date data in a form in which they can understand them and use them for taking rational decisions can at this stage prove to be of enormous value in solving India's food problem at minimal cost.

Objectives of Agricultural Policy

22. Stated very broadly the objective of agricultural policy is to assure adequate availability of agricultural products at reasonable stable prices. These prices should be

high enough to be remunerative to the farmers and low enough to be acceptable to the consumers. To ensure stability in the context of uncertain weather, buffer stock operations have to be carried out. Since carrying buffer stock is expensive, an optimum policy has to be designed.

23. To provide adequate food for increasing population means to increase the productivity of land by promoting efficient practices and spreading knowledge of new possibilities. A whole range of options are available for this: Increase irrigation; increase use of fertilizers (chemical or organic) and pesticides; use different varieties of seeds; etc. With limited resources, these and other inputs must be optimally used and policies have to be devised to promote optimal uses.

24. Similarly, with limited water resources, a better management of available irrigation systems can substantially affect output. With a given quantity of irrigation water, which crop to irrigate, when to irrigate and with how much water, are important questions.

25. Apart from increasing the productivity of agriculture, a proper distribution of income generation in the agricultural sector is also desirable, Agricultural development should not lead to increasing inequality in the rural economy.

26. On the other hand, from the farmer's point of view, what crop to grow, what variety to select, how much inputs to put in, and when to sell the output, are the crucial questions. These are affected by his expectations of prices, his knowledge of technology, his resources and the weather. In all these the farmer's main objective is to maximize his expected profits.

Issues in Agricultural Policy

27. Specifically the following decisions of agricultural policy are of importance:

(a) What crop and variety to sow in what areas?

(b) What should be the level of inputs?
  - Fertilizers
  - Water
  - Pesticides

(c) When should the inputs be applied?

(d) What other cultural practices are of importance?
  - Timing
  - Spacing, seed rate
  - Soil treatment
  - etc.

(e) When to sell the output?

(f) What type of animals to keep? How many of each type to keep?

(g) What to feed the animals?

(h) Should one go in for poultry keeping?
What should be the level of operation?

Decisions of Policy Makers

28. (a) Short Term Management

i) Estimate output to help in budget making.

ii) Estimate import needs and if necessary, provide for in foreign exchange budget.

iii) Determine advance action required in setting up public distribution system and fixing procurement targets.

iv) How much buffer stock to be carried over to next year?

v) Support prices to be announced.

vi) Prices of inputs such as fertilizers to be fixed.

vii) If necessary, inputs to be imported in time.

viii) Identify drought areas, to take relief measures in time.

ix) Determine policy for operating irrigation systems. What is the trade-off between irrigation and power generation? How much water to release? When, to which crop? Modification in the policy in the light of actual rainfall and inflows.

x) Detect in time incidence of pests and diseases so that control measures are taken in time.

(b) Medium Term Policy

i) Set targets of food availability to meet nutritional needs.

ii) Determine optimal cropping pattern for irrigated, rainfed and arid zones.

iii) Set targets for area under High Yielding Varieties.

iv) Increase potential for production through efficient use of fertilizers, irrigation etc.

v) Determine optimal allocation of fertilizers to different crops and agro-climatic zones.

vi) Determine optimal allocation of irrigation resources - to different crops.

vii) Determine priority areas for extension work.

(c) Long Term Policies

i) Set targets for irrigation development to insure against droughts.

ii) Set priorities for development of irrigation systems.

iii) Design irrigation system - what is the irrigation intensity? Storage capacity? How to mitigate effects of floods?

iv) Set targets for availability of fertilizer.

v) What should be the policy towards mechanisation? Is it land augmenting?

vi) Are there economies of scale in agriculture? What should be the size of a family's holding?

vii) Set research priorities - what new seeds to be developed for which crop and which zone and with what characteristics?

viii) What measures to take to preserve or improve general long term productivity of the system.

29. In order to take these decisions rationally research involving large amount of data processing is required in many areas. Some of the important areas are listed below:-

Useful Research for Decision Making

30 (a) Research in the technology of Agriculture and Animal Husbandry

i) Estimate production function of different crop varieties in different agro-climatic regions when independent variables are fertilizers, and/or water and climatic variations.

ii) Identify optimum techniques to irrigate, fertilize, sow etc. (Mechanisation or not?)

iii) Develop improved breed of animals. Maintain data bank of yield performances of progeny.

iv) Estimate production functions in animal husbandry. What feeds give best results for which breed?

(b) Ecological Considerations

i) What practices are good for soil-fertility maintenance?

ii) Bio-system studies to identify measures to preserve them for all users.

iii) Toxicity of chemicals - what pesticides .... and other agro-chemicals are acceptable.

iv) Toxic residues in food and their . . . . long term acceptability of chemicals.

(c) Climate and Weather Fluctuations

i) Can one forecast yields and output from climatological data?

ii) What is the expected date of 'arrival of monsoon in different parts of the country? Or what is the expected date of having enough moisture in the soil to begin sowing?

iii) What is the variability of rainfall and climate? What is the expected soil moisture availability over the year? What is a suitable crop cycle for the area?

iv) What is the relationship if any, between occurrence of diseases and pests and climate?

31. The above list is not exhaustive. Moreover many questions are overlapping and repetitive. Yet these have been separately listed to emphasise to a larger number of people the usefulness and need for an information system. People from different disciplines might view a problem from differing perspectives. None the less the basic theoretical framework for analysis can be common to most of these questions. We now turn to analytical frameworks appropriate for decision making in the agricultural sector.

32 Analytical Frameworks for Policy Making

(a) Analytical Framework for Pricing and Allocation

i) Farmers Decisions

We assume that :

farmers are rational and act in such a way as to maximize expected profits as perceived by them. Because of uncertainties of weather, effectiveness of new technology etc., and their different endowments of resources, different farmers behave differently. Yet within their constraints they maximize their profits.

33. For rational decisions at the farm level one needs to know the following:

(a) Technological production functions which relate expected yield for his soil and climate to the levels of various inputs.

(b) The prices and costs involved in using various inputs.

(c) The expected price of various produce.

34. Thus if proper input and output prices are fixed in advance a farmer can

(a) Allocate his land to different crops, and

(b) Decide on the levels of application of different inputs.

35. Formally, the farmer's decision problem is a non-linear programming problem as described below:

Maximize Profit,

$$\sum_{i=1}^{C}(P_i a_i y_i - c_i(a_i, y_i))$$

where P_i = price of output i

a_i = area devoted to crop i

y_i = yield of crop i (output per unit land)

c_i = cost of cultivating crop i on area a_i to obtain yield y_i

C = Number of crops which can be grown on that land (different variety to be considered as a different crop).

Subject to the constraints:

(a) Area constraint

$$\sum_{i=1}^{C} a_i \leq A$$

– Area devoted to crops cannot exceed total land area available with him, A.

(b) Production Functions

$$y_i = y_i\,(N_i\,,\ P_i\,,\ K_i\,,\ w_i^1\,,\ w_{i,}^2 \ldots, w_i^J, \ R^1, \ R^2, \ R^J,$$
$$PET^1, \ PET^2, \ldots, \ PET^3, \ PEST_i\,)$$

Where N_i, P_i, K_i are fertilizers applied per unit area to crop i,

$PEST_i$ is the pesticide applied to crop i,

w_i^1, $w_i^2, \ldots, w_i^J$ are water applied in periods 1, 2, ... J of the i crop's life cycle.

$R^1, R^2, \ldots, R^J$ are the expected rainfalls over the periods, 1, 2, ..., J.

$PET^1, \ldots, PET^J$ are potential evapotranspiration over these periods.

(c) Cost Functions

$$c_i = c_i\,(a_i,\ y_i\,(\underline{\hspace{3cm}})\,)$$

(d) Water availability constraints

$$\sum_{i=i}^{C} W_i^i \leq T^j \qquad j = 1, \ldots\ldots, \ J$$

Where T^j is the water available in period J from either tubewells or run of the river schemes, or planned irrigation releases.

(e) Fertilizer availability.

$$\sum_{i=1}^{C} F_i \leq \bar{F}$$

36. If fertilizers are scarce and a rationing system is followed, such constraints may be required. This also applies to other inputs.

37. In the above the policy variables which can be controlled by the central authority are prices of inputs and outputs and the irrigation releases planned. The technological information is embodied in the production function y_i's, and the cost function c_i's.

38. The production functions, y_i's, have to be estimated based on experimental data. For examples of these see Parikh et al (1974) and Minhas, Parikh and Srinivasan (1974).

39. Similarly the cost functions have to be estimated on the basis of farm management surveys. Cost is a function of the levels of various inputs. Either a detailed cost function can be introduced and levels of these inputs determined in the solution, or as a second best solution, the cost functions can be preprocessed to give a summary cost as a function of only area and desired yield as used above.

40. It should however be realized that these production and cost functions have to be estimated separately for each soil and climatic regions. The fineness of this classification can be improved over time when more data become available.

41. The above is a simplified model which neglects the problems of uncertainty of yield performance, of rainfall, of climate and of prices of output. A dynamic programming model can be constructed to take into account these variabilities. However, the data available for estimating the various frequency distribution are not likely to be available for some time. Thus the above framework or even a still simpler model can be used in the early stages.

Decisions of Policy Makers

How such an analytical framework can be used to take important decisions in the management of the agricultural sector is described in Minhas's (1969) 'Growth with Stability'. Briefly his scheme is as follows:

(a) Determine normatively a requirement vector of agricultural products.

(b) Fix a set of input and output prices.

(c) Solve the above model for all the different agroclimatic zones.

(d) Compare the resulting output with the normatively determined requirements.

(e) Adjust prices and iterate through steps 2 and 5 till a consistent solution is obtained. This gives a set of output and input prices which produces the desired output.

The same basic model can be modified to determine 'optimal' allocation of scarce input such as fertilizers. As an example see Parikh et al (1974). It can also be used to project agricultural potentials for a distant future to identify the need and importance of various technical changes (see Parikh (1973)).

Analytical Framework for Water Management

In order to study the question of economically optimal use of water, we need to know the responses to different quantities of water used by the crop throughout its growth cycle. For instance, consider a large reservoir system. The problems of scheduling of the operations of the system include decisions on timing of water releases and the allocation of water among crops. The later decision is also relevant for the operation of tubewells or run of the river irrigation systems. Unless one has the knowledge of the marginal productivity of water allocated to each crop at different stages of its growth, one cannot arrive at an optimal set of decisions. This knowledge is also required in determining the extent of the command area of an irrigation system. A production function for each crop, in which yield is related to dated inputs of water will provide such knowledge.

(a) Suppose the reservoir has a given amount of water per hectare, W, assume also that only one crop is grown. We want to maximise the production

$$Y = Y(W^1, W^2, \ldots, W^J)$$

Where Y is yield per hectare, and

$W^1, W^2, \ldots, W^J$ are water releases in the 1st, 2nd, ... Jth period:

Subject to the constraint that

$$W^1 + W^2 + \ldots + W^J \leq W$$

The conditions for optimality are

$$\frac{\partial Y}{\partial W^1} = \frac{\partial Y}{\partial W^2} = \ldots = \frac{\partial Y}{\partial W^J}$$

In order to solve this problem we need to know the production function Y. On how to estimate Y see (Minhas, Parikh and Srinivasan (1974).

(b) Suppose we have a limited amount of water available in period j, I^J, and that crops 1, 2, ..., C are grown in areas $a_1, a_2, \ldots, a_C$.

We want to maximize value of output:

$$V = \sum_{i=1}^{C} P_i \cdot a_1 \cdot y_i (W_i^1, W_i^2, \ldots, W_i^J)$$

Subject to

$$\sum_{i=1}^{C} W_i^j a_i \leq I^j \qquad j = 1, \ldots, J$$

The condition for optimal allocation of water across crops and over time are as follows:

$$P_1 \frac{\partial Y_1}{1\partial W_1^j} = P_2 \frac{\partial Y_2}{\partial W^j} = P_c \frac{\partial Y_c}{\partial W^j} \qquad j = 1, 2, \ldots J$$

Again knowledge of the production function Y_i is essential.

(c) A problem which is a combination of the problems (a) and (b) above. Though the algebra gets involved the essential approach is the same. Once again knowledge of the production function Y_i is essential.

(d) Consider the problem where the water in the reservoir is $W_\cdot$ and inflows of the remaining seasons are $I^1, I^2, \ldots, I^J$ with their probability distributions $p^1(I^1), p^2(I^2)$ .... given. The cropping pattern in the command area is $a_1, a_2, \ldots a_C$ (area devoted to crops $1, 2, \ldots {}^C$). Also the water releases from the reservoir generate power and the variations in the requirement of power over the year do not in general coincide with the variations in the need for irrigation releases. Thus, to some extent more irrigation means less power and vice-versa. In scheduling the operation of such a multipurpose system it is necessary to decide:

i) schedule of irrigation releases and power generation, and

ii) the year end dead storage level.

For a detailed treatment of this set of problems and a case study of the Bhakra System see Minhas et al (1972).

(e) In the above problems we have neglected the essential stochastic nature of moisture availability and requirements. A dynamic programming framework is required to satisfactorily take these into account. We now describe such a model.

Suppose: We have a reservoir with water RW^i in period i. The inflows are I^i with probability distributions $p^i(I^i)$. The PET's are PET^i with probability distribution $p^i(PET^i)$. The areas devoted to different crops are $a_1, a_2, \ldots, a_c \ldots a_C$ and their yield responses are $Y_c(AET^i/PET^i)$
Soil moisture levels are SM_c^i
State Variables are the soil moistures in different plots, $SM_1^i, \ldots\ldots SM_C^i$ crop yield indexes to reflect history till now, $YC_1^i \ldots\ YC_C^i$, and water in reservoir, RW^i.
Policy Variables are $W_1^i, \ldots, W_c^i$ the irrigation water releases for such crop in period i.

The value at the beginning of period i of all standing crops reservoir level and soil moistures is given by a function V^i.

$$V^i\,(SM_1^i \ldots SM_C^i,\ VC_1^i \ldots VC_C^i,\ RW^i)$$

$$= \max_{W_1^i \dots W_C^i} E \sum_{c=1}^{C} (V_c^i (VC_c^{i\ \max}, AET_c^i (U_c^i) + V^{i+1}(\qquad).$$

Where E is the expectation operator and V_c^i is the gains function in the value of crop c due to irrigation operations in period i. The various relationships are as follows:

(a) $SM_c^{i+1} = SM_c^i - PET^i + E(R_c^i) + W_c^i$.

(b) $AET_c^i = f_c (SM_c^i , PET^i)$

(c) $YC_c^i = E\ Y_c (AET_c^i/PET^i)$

where $AET_c^i \dots AET_c^n$ are stochastic variables and

$AET_c^1 \dots AET_c^{i-1}$ given.

(d) $RW^{i+1} = RW^i + E(I_c^i) - \sum_{c=1}^{C} w_c^i - PET^i . A(RW^i)$

where $A(RW^i)$ is the area of reservoir as a function of water in reservoir.

This is a formidable problem and even then it is not the most general one as the areas devoted to different crops are not considered policy variables as in fact, they are. To actually carry out computation for such a model requires collection and preprocessing of large amount of data. However, one need not start with such a super model. Simplified partial models such as those described in (1) to (4) above can be used meanwhile. For description of stochastic partial models of water management see the series of articles by Dudley et al (1971 ab., 1972 ab.) and the article by Hall and Butcher (1968). In fact in the first stage one would use such partial models, and as more data become available, let the system evolve and grow to the model described above or beyond that to more complex ones such as would determine area allocations internally.

*Data Requirement and Availability**

As is obvious large amount of data are required. These may be grouped under the following broad headings:

(a) Various Agronomic Experiments
(b) Simple Fertilizer Trials
(c) Potential Evapotranspiration
(d) Rainfall data by stations

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* This section is prepared with the help of the member of the project team, and especially with the help of Dr. Yayathi.

(e) Irrigation Availability by schemes-canals and command area details
(f) River inflow data
(g) Actual area, yield, production
(h) Soil type and characteristics
(i) Residual soil fertility
(j) Water tables.

45. All these data are required for as long a time series as possible for building up expectation functions and frequency distributions.

46. Vast amount of data are collected in India. Moreover data for many years are available. We now examine in detail the present availability of data and the form in which these are available as well as the volume and frequency of collection. We will also consider the limitations of these data.

Crop Area Statistics

47. Practically 93 per cent of the country's geographical area, excepting for the hilly and inaccessible areas and the occupied area of Jammu and Kashmir, are covered by some reporting agency or other. The data on area devoted to various crops are collected every season by complete ennumeration of all plots in every village excepting for the states of West Bengal, Orissa and Kerala where data are collected on the basis of a random sample.

48. These data are available for more than last 20 years. Districtwise data are published and can easily be put on punched cards, (one year's data would require about 1000 cards). Villagewise data are available at the Tehsil headquarters and Tehsilwise data are available at the district headquarters. These may also be easily obtained and transferred on the punched cards (four cards per village per year). Plotwise data are available at the village level and would be voluminous. If, and when, these data are computerized they can provide scope for a variety of studies at micro-level which would be extremely useful for their implications for welfare oriented policies.

49. The data on area under different crops for the current season are also available soon after sowing is completed, under the Timely Reporting System (TRS) on a sample basis (one out of every five villages). Thus the data on area can be kept almost upto-date making it possible to analyse issues of short term policy.

50. Data on area and production of plantation crops like coffee, tea, rubber, cardamom etc. are available in very great detail in the records of the Boards which control the cultivation of these crops. The data recorded annually, are available for individual cultivators.

Yield and Production Statistics

51. The estimates of yield and production are based on crop cutting experiments. At present about 1,50,000 crop cutting experiments are conducted annually on food and non-food crops. Along with the data on yield auxiliary information is also collected in these experiments. These data on yields can be readily computerized and the system be made upto-date. Data from past crop cutting experiments are available for almost 20 years. One year's data would require 0.6 million cards.

In addition, as a part of its study on impact of HYVs, the IARS conducts around 20000 crop cutting experiments a year over 80 selected districts. In this programme information on other cultural practices are also collected. It has been going on for the last four years and these data are already on nearly 1 million punched cards.

Soil Resources Data

52. The All-India soil survey and various coordinated schemes for studies on soil salinity, irrigation, drainage, soil science and water management collect large volume of information on soil data. A large number of soil testing centres distributed throughout the country analyse more than 11, 00, 000 soil samples each year under the soil test crop response studies. About 2, 00, 000 soil samples are collected each year under the All-India Soil Survey Scheme.

Improved Seeds, Use of Fertilizers and Other Improved Practices

53. Data collected in periodic sample surveys do provide some information on these aspects. However, more reliable and comprehensive schemes to collect these data have recently been taken up. In addition to the IARS Scheme on Impact of HYVs mentioned above, the National Sample Survey Organisation (NSSO) canvasses 30000 fields a year as a part of the Scheme to Improve Agricultural Statistics (IAS) Scheme). Other surveys are also carried out by the Ministry of Agriculture and organisations such as Fertilizer Association of India.

Input-Output Relationships

54. The crop cutting surveys provide estimates of yields per unit area in irrigated and unirrigated land in different states. A large volume of data relevant to the estimation of input output relations is generated by the various all India crop improvement programmes of the Indian Council of Agricultural Research (ICAR). The simple fertilizer trials conducted as part of national demonstration programme have accumulated a vast body of information on yield responses to fertilizers. On the basis of these, yardsticks of response of major crops to irrigation and fertilizers in irrigated and unirrigated conditions have been evolved. In general these yardsticks are related to the effect of particular inputs on yields. However, in the case of high yielding varieties a composite yardstick intended to reflect the additional production from the application of the recommended package of inputs and management practices have been estimated.

55. Specifically the following major IARI and ICAR projects provide vast amount of data, most of which are available on punched cards.

(a) Coordinated Scheme on Micronutrients of Soils:

Objectives:

(i) Study of micronutrient deficiency, symptoms and their uptake by indicator crops most sensitive to these nutrients.

(ii) Establishment of critical limits for the micronutrients in important crops.

(iii) Relationship and determination of micronutrient needs of crop requiring high dose of fertilizers.

(iv) Delineation of the areas of micronutrient deficiency.

(v) Response of added micronutrients on the representative soil of the region and their relationship to micronutrient content of plant and the available micronutrient content of soils.

Locations: 8; Period: 1. 4. 69 to 31. 3. 74
(data available from 1. 4. 67 at some centres)

(b) Coordinated Scheme on Microbiological decompositions of Organic matters in Indian Soils under different climatic conditions:

Objectives:

To investigate the types of micro-organisms associated in the decomposition of organic matter and course of decomposition in Indian soils, the influence of organic matter on soil structure and crop growth and yield.

Locations: 6; Period: 14. 8. 67 to 31. 3. 74 5 year project.

(c) Coordinated Agronomic Experiments Scheme (Model Agronomic Experiments Scheme and Simple Fertilizer Trials Scheme):

Objectives: For IIIrd Plan 1967-68 to 1972-73:

(i) To obtain scientific information of the individual aggregate and cumulative effects of a number of growth factors (fertilizers, variety, cultural practices etc.)

(ii) To study the relative efficiency of nitrophosphates, ground rock phosphate and other phosphate fertilizers as compared to superphosphate or ammonium phosphate and also response of acid soils to liming.

(iii) To determine maximum intensity of cropping possible in different agro-climatic regions.

(iv) To obtain any information on any aspect of dealing with fertilizer use as might be required by ICAR.

Locations: 75

Objectives: For IVth Plan:

(i) To work out the response surface for N, P, K, for different crops in different agro-climatic regions of the country with emphasis on newly introduced high yielding varieties.

(ii) To work out the relative efficiency of different phosphate fertilizers (of varying citrate and water solubilities) for legumes and their residual effect on cereal crops.

Model Agronomic Experiments: at 46 Centres, start of project different at different centres the earliest being from 1.5.56.

Simple Fertilizer Trials: High yielding varieties at 30 locations, Rainfall at 20 locations.

(d) All India Coordinated Research Project on Soyabeans:

Objectives:

To evolve high yielding varieties of soyabean suitable for different agro-climatic conditions.

Locations: 11; Period: April 1967 to 31 March 1971 extended to 31 March 1974.

(e) All India Coordinated Research Project on Cotton:

Objectives:

To intensify the research work for increasing the average yield in cotton growing tracts and fibre quality of indigenous varieties.

Locations: 29, Period: April 1, 1967 to 31 March 1971 and extended to 31 March 1974.

(f) Coordinated Scheme on Soil test Crop response Correlation:

Objectives:

To conduct research on the fundamental and applied aspects of soil test crop response correlations on district and agro-climatic basis with a view to improve the prediction of soil tests.

Locations: 13, Period: 1.4.67 to 31.3.74 five year project.

(g) Coordinated Scheme for Studies on Measurement Evaluation and Improvement in soil structure-IV Plan Scheme:

Objectives:

To standardise certain basic techniques for evaluating soil structure with a view to work out a simple value index of soil structure that correlates best with crop yield.

Locations: 9; Period 1.4.69 to 31.3.74 five year scheme.

In addition, there are a large number of other projects conducted by the various agricultural universities. These are reported and published in the National

Index of Agricultural Field Experiments. Data from past experiments can be computerized with modest effort, and a scheme can be organized to get data from new experiments for the information system.

Cost of Cultivation:

56. The Farm Management Surveys sponsored since 1954-55 by Department of Economics and Statistics of the Ministry of Agriculture give the cost of production of field crops on per hectare and per unit of production basis. The surveys also provide data on the extent of employment and unemployment of family labour and availability of capital equipment on farms. These surveys in the past have covered only a limited part of the country and were not frequent. However, a programme to cover the country regularly is started and data on sample basis are being collected in different states on a continuing basis. More than 7,000 farms are covered every year and data on daily expenditures and inputs are collected. Monthly summaries of these data are put on punched cards and one year's data require nearly 5 million cards.

In addition, cost data are also available from many surveys conducted by Institute of Agricultural Research Statistics as also from surveys of National Sample Survey.

The Farm Management Survey data for the last three years are already on computer cards and the future data are also to be processed on a computer.

Prices of Output:

57. Weekly data on market arrivals, trade stocks, sales, prices and market situation are being collected from about 1,000 markets in all the States. Though, the total number of markets as well the distributions of their number among crops has varied over time all the important markets are covered. Retail price data on about 72 commodities from 100 centres in the country are also collected, and from about 70 markets data on trader's margins are collected. For eight weeks around harvest times data from all districts are collected for farm harvest prices.

Distribution of Land holdings, Tenancy and Income:

58. The agricultural census of 1971 carried out by the Ministry of Agriculture has collected information on a variety of items such as size, tenancy rights etc. for nearly 70 million operational holdings in the country. The data for many states are already available on magnetic tapes. The total number of cards for this census data would be around 70 million cards.

59. It is also proposed to regularly up date these data through sample surveys in the future.

60. The data on inequalities in income, consumption and savings and pattern of employment and wages are available from NSS and Farm Management Surveys.

Animal Husbandry

61. Livestock census have been carried out in India every five years since 1920. Data on size and composition of livestock as well as age distribution of livestock are

collected. Though village level data are available at the tehsils, only tehsilwise data are published.

62. Data on output of milk, eggs and other animal products have been estimated so far only on ad-hoc basis. However, systematic sample surveys are now conducted every year to collect these data regularly. The animal husbandry division of the Directorate of Economic and Statistics (DES) of the Ministry of Agriculture collects data on livestock products. The IARS also conducts livestock products survey in selected states. These data are transfered onto 0.25 million punched cards per year.

63. Research in animal husbandry is reported in the National Index of Animal Experiments. Input output relationships for livestock operations can be estimated from these experiments. Data on economies of cattle and buffalo keeping and daily operations are collected from selected districts by the IARS. Under the dairy impact survey data are collected on various aspects of the economy of the selected districts. These surveys generate 0.5 million cards a year.

Machinery Implements and Investments:

64. In the livestock census, data are also collected in respect of ploughs, carts, sugarcane crushers, oil engines used in irrigation, electric pumps, persian wheels, tractors and ghanis.

65. The Rural Credit Surveys of Reserve Bank of India provide data for estimating gross and net investment and the sources of finance. Comprehensive data on annual basis are available for credit given by the institutional credit channels.

Fishery:

66. Central Marine Fisheries Research Institute collects data on catch of marine fish since 1950 on a sampling basis. Varietywise catch, type of equipment, duration of fishing etc. are reported.

67. No systematic data are available for catch of inland fishing.

Forestry:

68. Data on area and type of forests are collected by the state Forest Departments. Data are available on volume of standing timber and firewood as well as out-turn of these, as also of other minor forest products.

69. Though the data for forests under Forest Departments are fairly reliable, data for forests controlled by corporate bodies, civil authorities, and private owners are not complete.

Climatological data:

70. The India Meteorelogical Department will celeberate its centenary next year. Vast amount of data have been collected over the past hundred years. The IMD maintains an extensive network of observatories to record systematic and regular observations

relating to weather elements, like rainfall, pressure, temperature, wind etc. to detect and track storms and cyclones; to monitor cloud pictures and other data from satellites and to record earthquakes. The observational organisation as on 1.4.1974 consists of, among others (for complete details, refer to the publications, Observational Organisation, India Meteorological Department, Government of India, New Delhi), the following:-

Type of Observatory	Number	Elements Observed	Frequency of observation
Surface observatory	504	Some or all of the elements atmospheric pressure, air temperature maximum and minimum temperature, relative humidity wind speed and direction, rainfall, evaporation, sunshine and occurence of weather phenomena according to the class of the observatory.	One to eight observations a day according to the class of the observatory.
Agrimet observatory	123	Meteorological and biological, Meteorological elements observed include rainfall, air temperature, humidity, soil temperature and moisutre, wind speed and direction, evaporation and occurrence of weather phenomena like thunder-storm hail storm, frost, etc.	Twice a day.
Hydromet observatory	320	Some or all the elements rainfall, temperature, humidity, wind speed and direction, evaporation and sunshine.	One or more observations a day.
Raingauge	4000	Rainfall.	Once a day.

There are 47 surface observatories for which data for 100 years or more are available.

The data from 1945 onwards are on 25 million punched cards. Annual addition of data is at present 3 million punched cards. In addition IMD has a special division on agro-meteorology, which has collected data under following programmes:

(a) All India Co-ordinated Crop Weather Scheme: Data on crop stage and growth along with weather parameters are collected at 50 centres on experimental farms. These data are available for 5 to 30 years for different crops. The data are on 1 million cards.

(b) Soil Moisture Evapotranspiration Studies: Lysimetric observations are being made at a number of agromet stations, and the programme is to set up nearly 200 such stations with 2 to 3 lysimeters each.

Irrigation:

71. Data on various irrigation projects are available with the Central Water and Power Commission. These include complete details of reservoirs, canal network, culturable and command areas. Data are also available on the cropping patterns, soil type etc. for the command area.

Water Availability in Rivers:

72. Data from 1003 gauges and 1862 gauge discharge sites are available for many years. The gauges measure water levels, three times a day whereas the gauge discharge sites provide discharge/day. These data are being transferred on computer cards and will take 1.5 million cards.

Ground Water Availability:

73. The ground water board as well as the various state tubewells organization have data on ground water potential and its exploitation. These data could easily be computerised.

Summary on Data Availability:

74. The above is a brief description of available data. The details of sample frames etc. are described by Saluja (1972). Comments on the limitations of these data are given by T. N. Srinivasan and A. Vaidyanathan (1972). The major limitation of these data arise from the incomplete coverage of the country. Nonetheless, complete coverage of the country is not always required and the data are capable of providing very useful guidance in policy making. The data availability is summarised in Table - 1.

75. From this review of data, it is quite clear that enough data are available in machine processable forms so that an information system can be made to function productively within a short time. It would be reasonable to expect analyses which will help in decision making within 6 to 12 months after the project is undertaken. Some of the data gaps may take some years to fill. Till then the analyses that may be carried out can only be less sophisticated. However, these analyses would still be better than what are possible without such an information system, and would lead to substantial improvements in policy decisions.

Outline of the System:

76. We can now outline an information system which will help in decision making in a series of policy issues. Our attempt would be to outline a system which starts

producing results as soon as some data are in and not a system which has to wait to produce results till all the data are in.

(a) The Data Storage:

The Data available are enormous and not all of them are required in raw form for analysis. Preprocessing will certainly be done and only processed data will be stored in files of high accessibility.

The data organisation for many files would be on the basis of agro-climatic zones/districts/tehsils/villages in progressive stages. For each of these regions the data stored in the processed form is described below:

Data stored by agro-climatic zones

Agricultural data

1. Irrigated/Rainfed Area under crops
2. Soil Resources, Type, Characteristics, Fertility status
3. HYV spread, area under different crops
4. Pesticide etc., use, intensity, extent
5. Fertilisers, Use, intensity and extent
6. Frequency Distribution of yields of different crops, varieties for irrigated and rainfed cultivations
7. Fertiliser dosages applied in past
8. Residual fertility in soil
9. Yield response functions to fertilisers, pesticides etc. for crop varieties for irrigated, rainfed cultivation
10. Expected output cost functions for different crop varieties and input levels
11. Price forecast functions
12. Expected prices. Frequency distributions of prices over the years
13. Distribution of size of holdings irrigation and soil type
14. Distribution of income, consumption, savings, employment, unemployment by size class of holdings.
15. Distribution of households by size class of holdings of implements machinery, engines/pumps.
16. Distributions of livestock
17. Milk yield and Egg out turn function for different feeds of different breeds
18. Growth feed functions for different feeds of different breeds

Climatological Data

19. Frequency distribution of rainfall by weeks and conditional prediction formulae
20. Frequency distribution of PET by weeks and conditional prediction formulae
21. Frequency distribution of soil moisture availability be weeks
22. Yield response functions to dated inputs of water for different varieties in different soils

23. Acreage prediction regressions based on climatic data
24. Yield prediction formulae based on climatic data
25. Pest incidence prediction formulae based on climatic data
26. Ground water exploitation and potential and recharge frequency distributions.

In addition, the following sets of files will be grouped by irrigation projects:-

27. a) Physical details of project
    b) Command area by different agro climatic zones
    c) All the data for the various zones of command area.

28. Frequency distributions of inflows at the reservoirs/wair by weeks and conditional prediction formulae.

(b) Use of Data:

These data files are required for specific purposes of analyses for decision making. Additional data files should be added whenever they are required in any decision making problem. One should avoid the temptation to store data for their own sake or for some possible future use. This may not only clutter up the system but would waste respurces in data transcription at the cost of data analyses.

Some examples of flow charts showing where these data files are used in decision making are given in figures 1 to 9. The general flow chart in figure 10 shows the flow and use of data in the system.

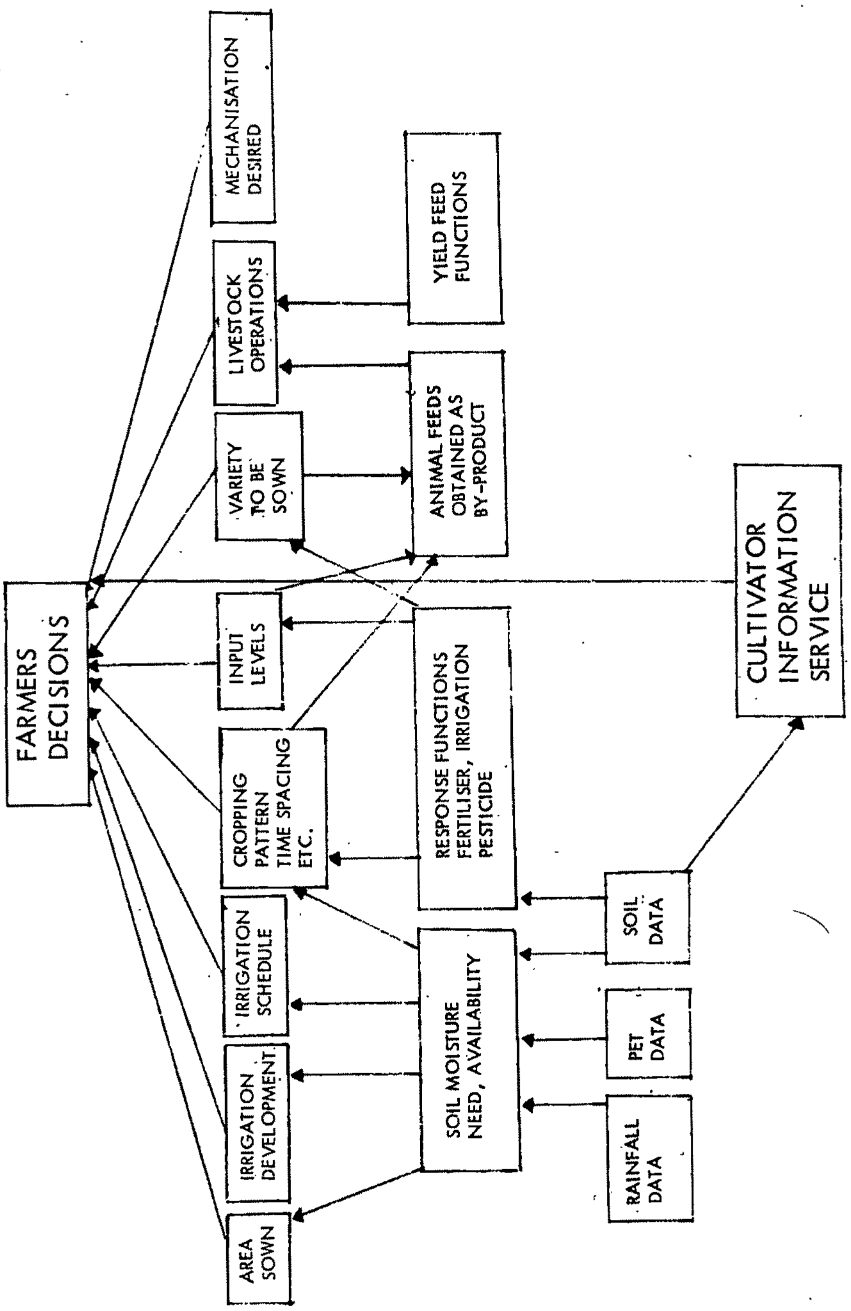

Figure 1. Farmers Decisions.

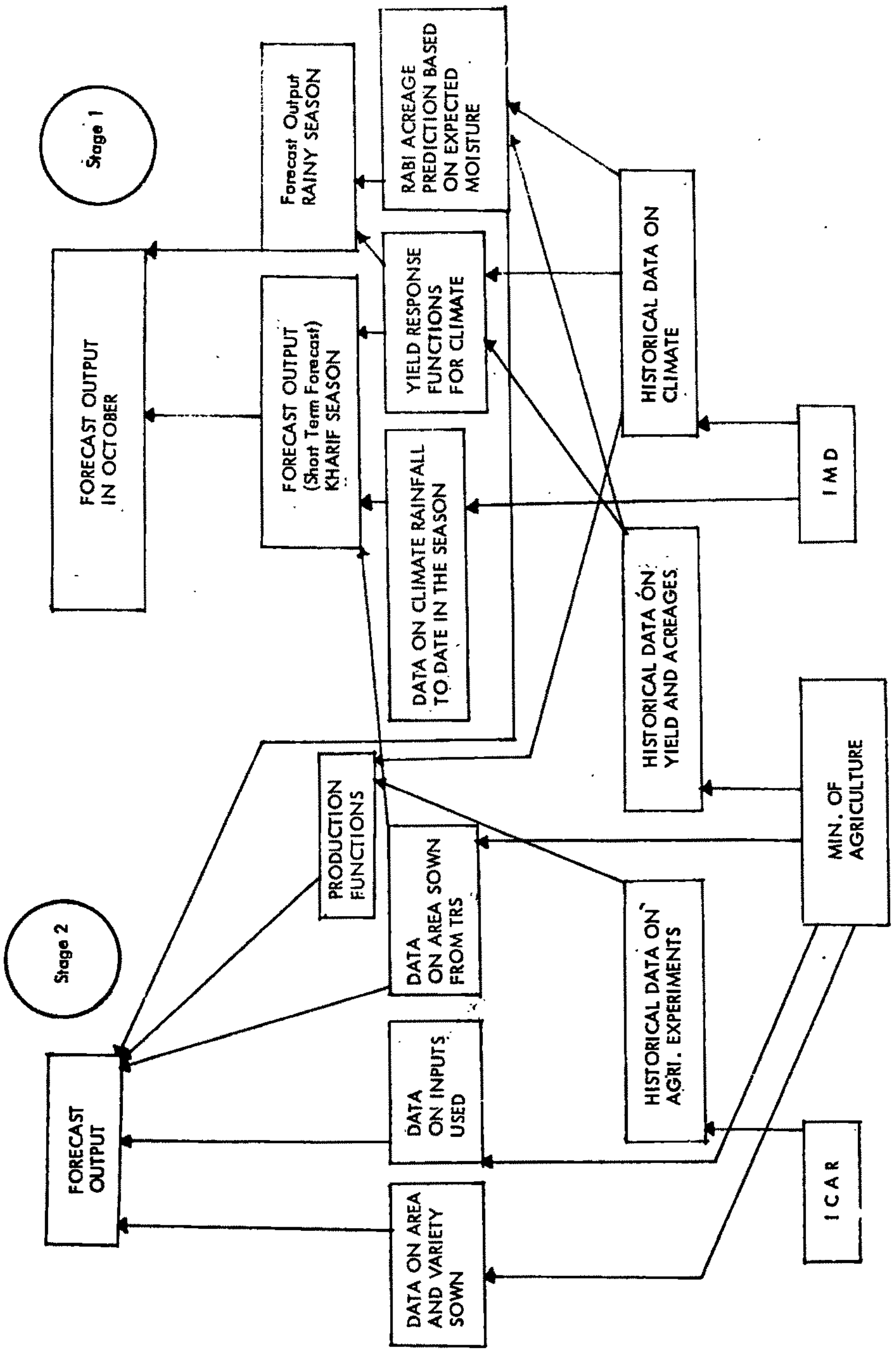
Stage 1
Forecast Output RAINY SEASON
RABI ACREAGE PREDICTION BASED ON EXPECTED MOISTURE
FORECAST OUTPUT IN OCTOBER
FORECAST OUTPUT (Short Term Forecast) KHARIF SEASON
YIELD RESPONSE FUNCTIONS FOR CLIMATE
HISTORICAL DATA ON CLIMATE
DATA ON CLIMATE RAINFALL TO DATE IN THE SEASON
I M D
HISTORICAL DATA ON YIELD AND ACREAGES
MIN. OF AGRICULTURE
Stage 2
PRODUCTION FUNCTIONS
DATA ON AREA SOWN FROM TRS
HISTORICAL DATA ON AGRI. EXPERIMENTS
FORECAST OUTPUT
DATA ON INPUTS USED
DATA ON AREA AND VARIETY SOWN
I C A R

Figure 2. Forecast Output.

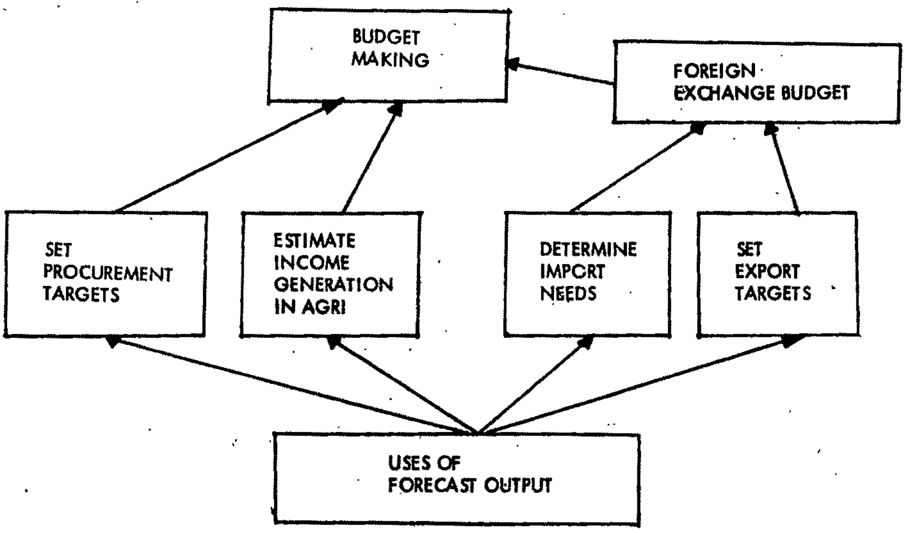

Figure 3. Uses of Forecast Output.

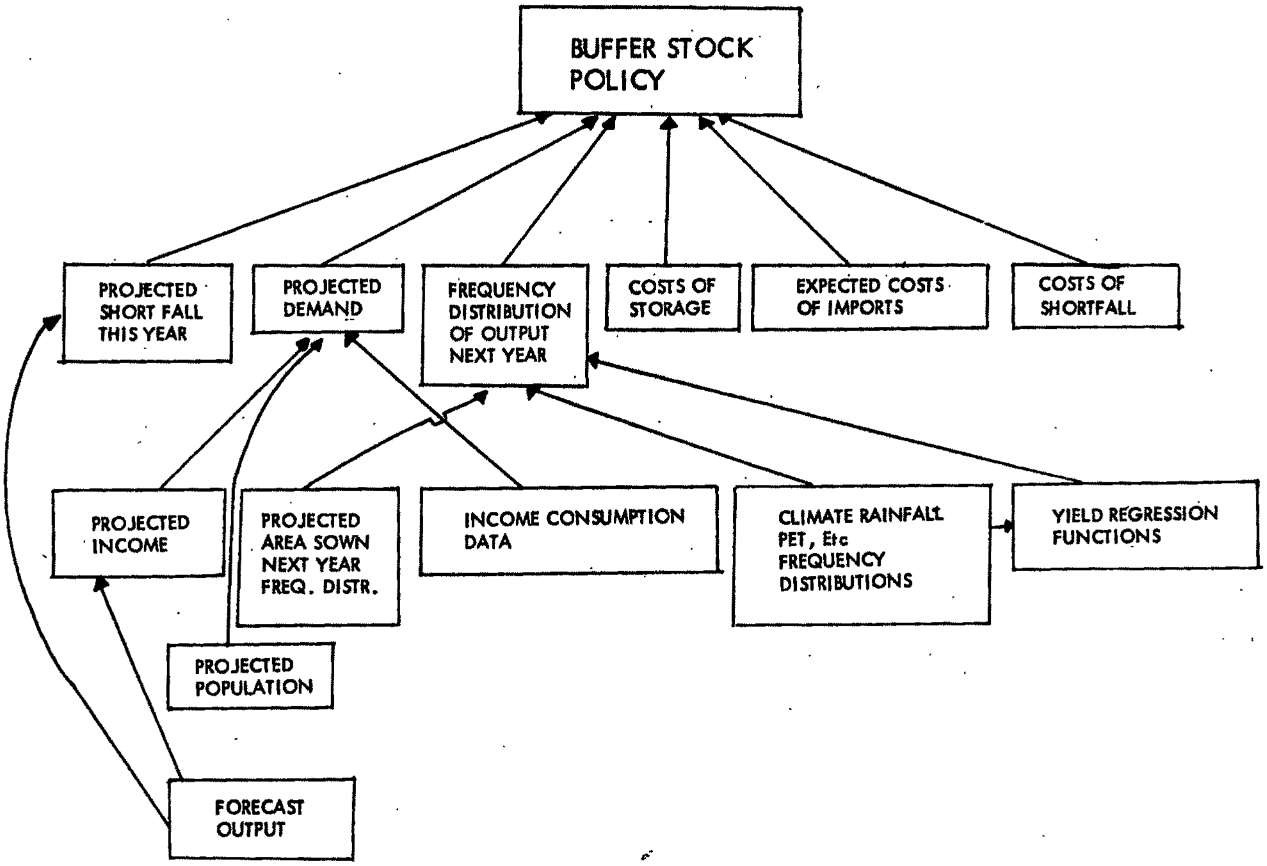
BUFFER STOCK POLICY
PROJECTED SHORT FALL THIS YEAR
PROJECTED DEMAND
FREQUENCY DISTRIBUTION OF OUTPUT NEXT YEAR
COSTS OF STORAGE
EXPECTED COSTS OF IMPORTS
COSTS OF SHORTFALL
PROJECTED INCOME
PROJECTED AREA SOWN NEXT YEAR FREQ. DISTR.
INCOME CONSUMPTION DATA
CLIMATE RAINFALL PET, Etc FREQUENCY DISTRIBUTIONS
YIELD REGRESSION FUNCTIONS
PROJECTED POPULATION
FORECAST OUTPUT

Figure 4. Buffer Stock Policy

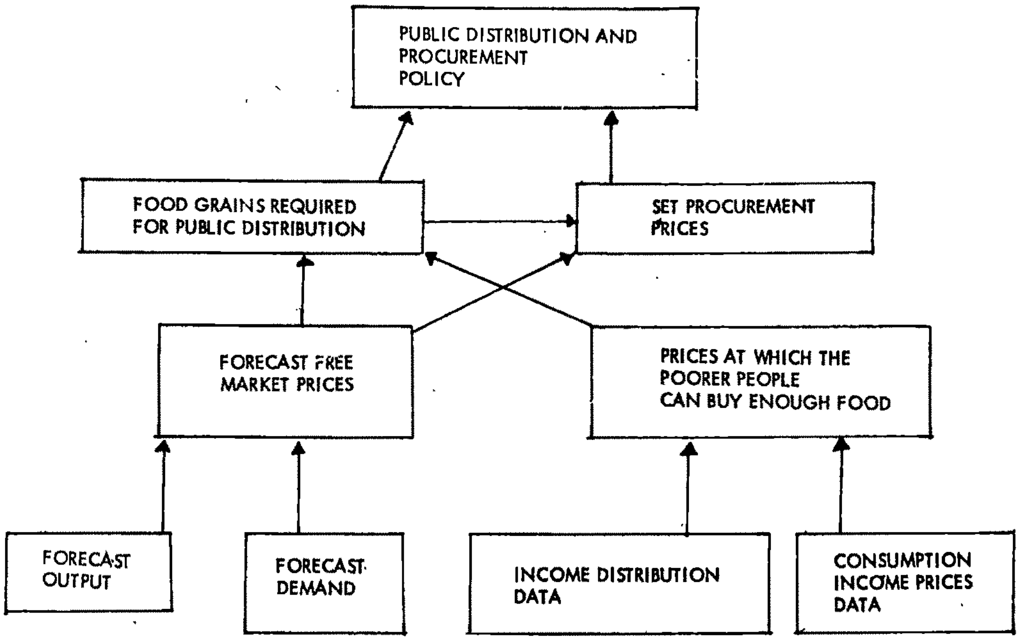
PUBLIC DISTRIBUTION AND PROCUREMENT POLICY
FOOD GRAINS REQUIRED FOR PUBLIC DISTRIBUTION
SET PROCUREMENT PRICES
FORECAST FREE MARKET PRICES
PRICES AT WHICH THE POORER PEOPLE CAN BUY ENOUGH FOOD
FORECAST OUTPUT
FORECAST DEMAND
INCOME DISTRIBUTION DATA
CONSUMPTION INCOME PRICES DATA

Figure 5. Public Distribution And Procurement Policy

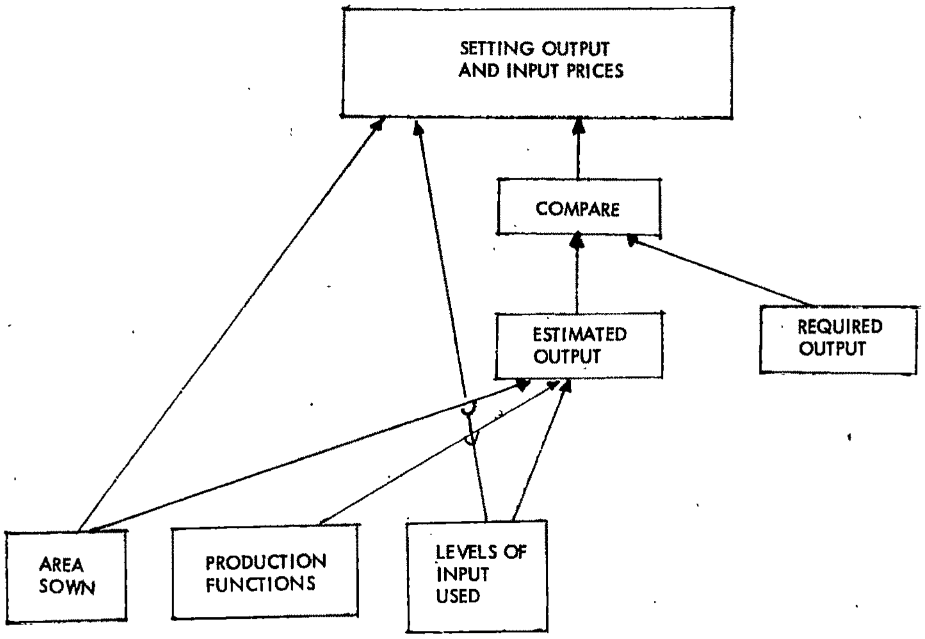

Figure 6. SETTING OUTPUT & INPUT PRICES

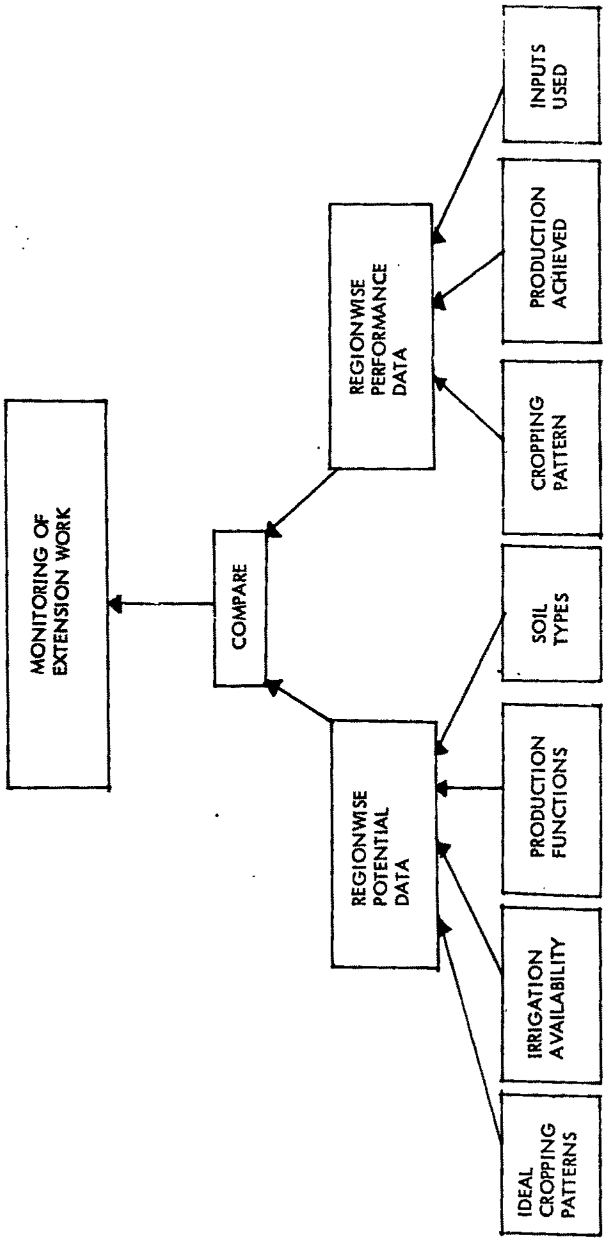

Figure 7. Monitoring Extension Work.

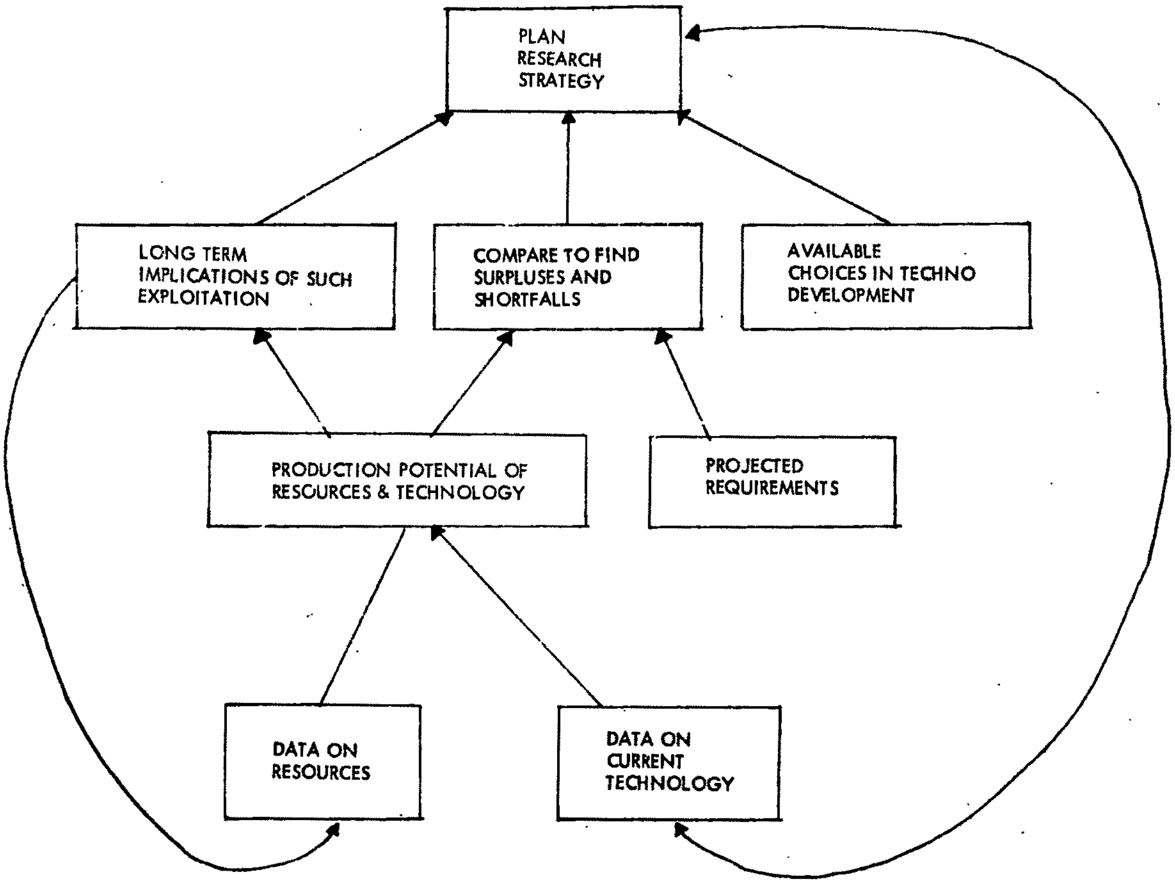

Figure 8. Planning Research Strategy

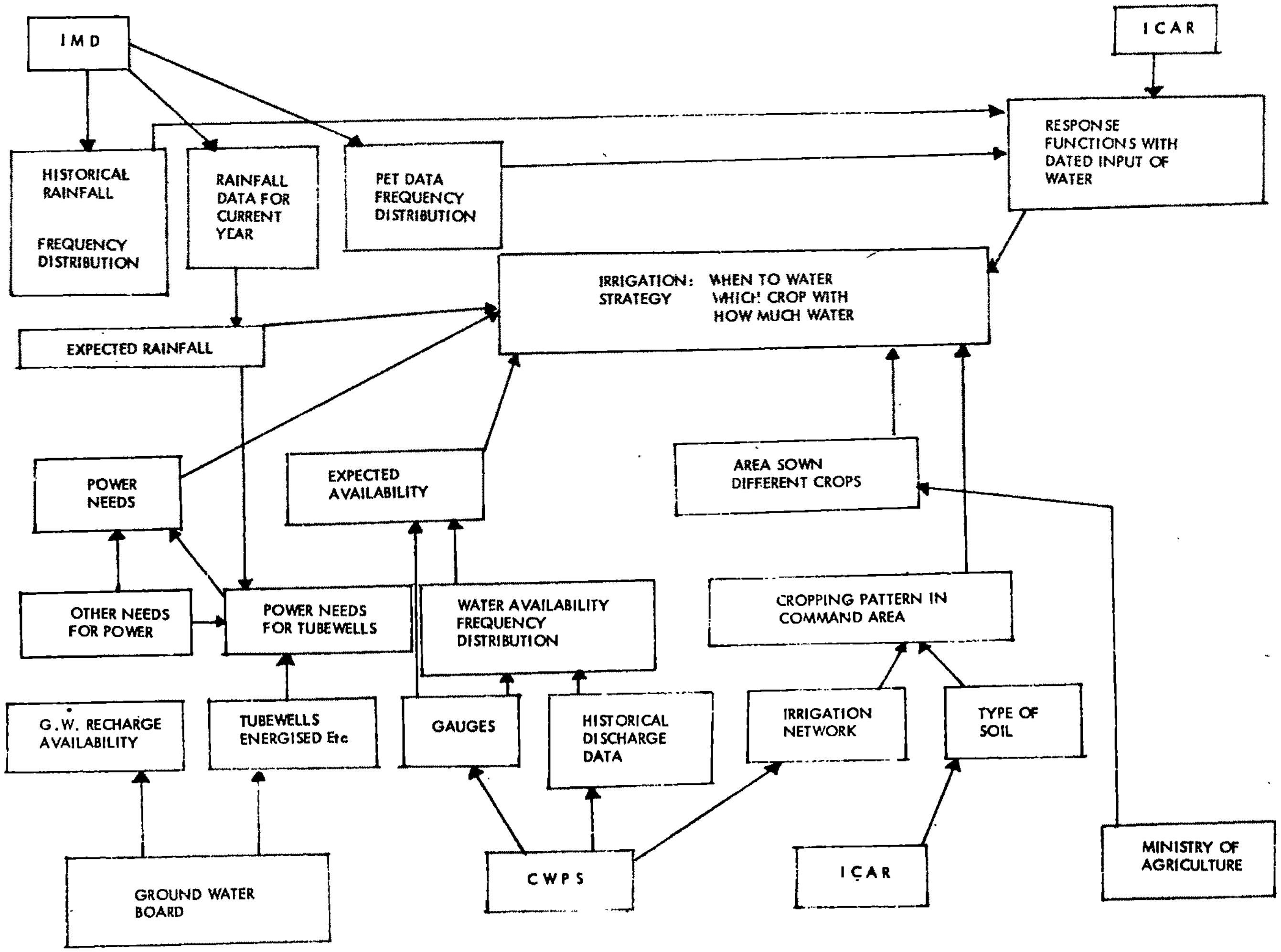
I C A R
I M D
RESPONSE FUNCTIONS WITH DATED INPUT OF WATER
HISTORICAL RAINFALL FREQUENCY DISTRIBUTION
RAINFALL DATA FOR CURRENT YEAR
PET DATA FREQUENCY DISTRIBUTION
IRRIGATION: STRATEGY WHEN TO WATER WHICH CROP WITH HOW MUCH WATER
EXPECTED RAINFALL
POWER NEEDS
EXPECTED AVAILABILITY
AREA SOWN DIFFERENT CROPS
OTHER NEEDS FOR POWER
POWER NEEDS FOR TUBEWELLS
WATER AVAILABILITY FREQUENCY DISTRIBUTION
CROPPING PATTERN IN COMMAND AREA
G.W. RECHARGE AVAILABILITY
TUBEWELLS ENERGISED Etc
GAUGES
HISTORICAL DISCHARGE DATA
IRRIGATION NETWORK
TYPE OF SOIL
GROUND WATER BOARD
C W P S
I C A R
MINISTRY OF AGRICULTURE

Figure 9. Planning Irrigation Strategy

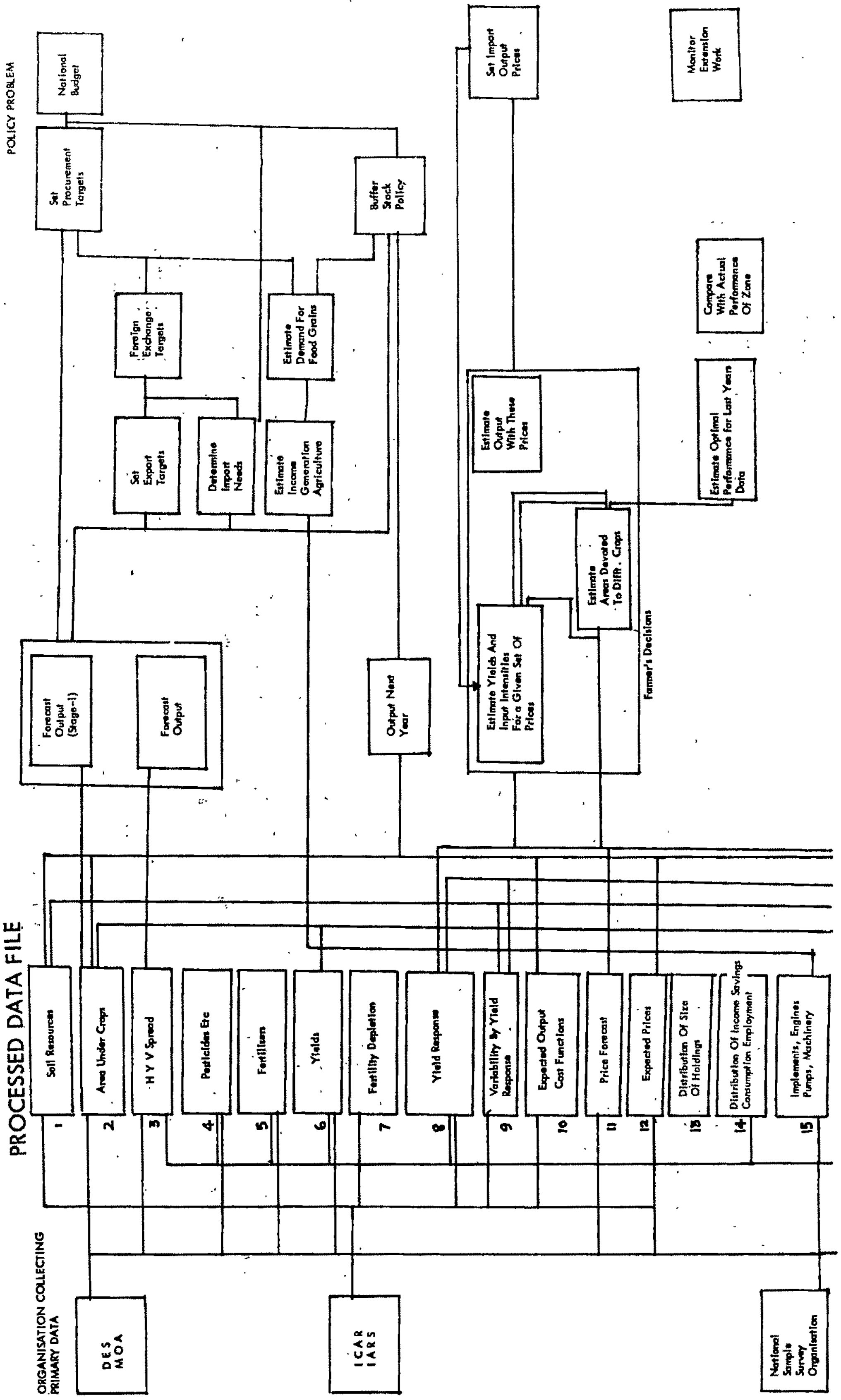
POLICY PROBLEM
National Budget
Set Procurement Targets
Buffer Stock Policy
Foreign Exchange Targets
Estimate Demand For Food Grains
Set Export Targets
Determine Import Needs
Estimate Income Generation Agriculture
Forecast Output (Stage-1)
Forecast Output
Output Next Year
Set Import Output Prices
Monitor Extension Work
Compare With Actual Performance Of Zone
Estimate Optimal Performance for Last Years Data
Estimate Output With These Prices
Estimate Areas Devoted To Diff. Crops
Estimate Yields And Input Intensities For a Given Set Of Prices
Farmer's Decisions
PROCESSED DATA FILE
Soil Resources
Area Under Crops
H Y V Spread
Pesticides Etc
Fertilisers
Yields
Fertility Depletion
Yield Response
Variability By Yield Response
Expected Output Cost Functions
Price Forecast
Expected Prices
Distribution Of Size Of Holdings
Distribution Of Income Savings Consumption Employment
Implements, Engines Pumps, Machinery
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
ORGANISATION COLLECTING PRIMARY DATA
DES MOA
ICAR IARS
National Sample Survey Organisation

Figure 10. General Flow Chart Of The System.

INFORMATION SYSTEM FOR AGRICULTURAL SECTOR

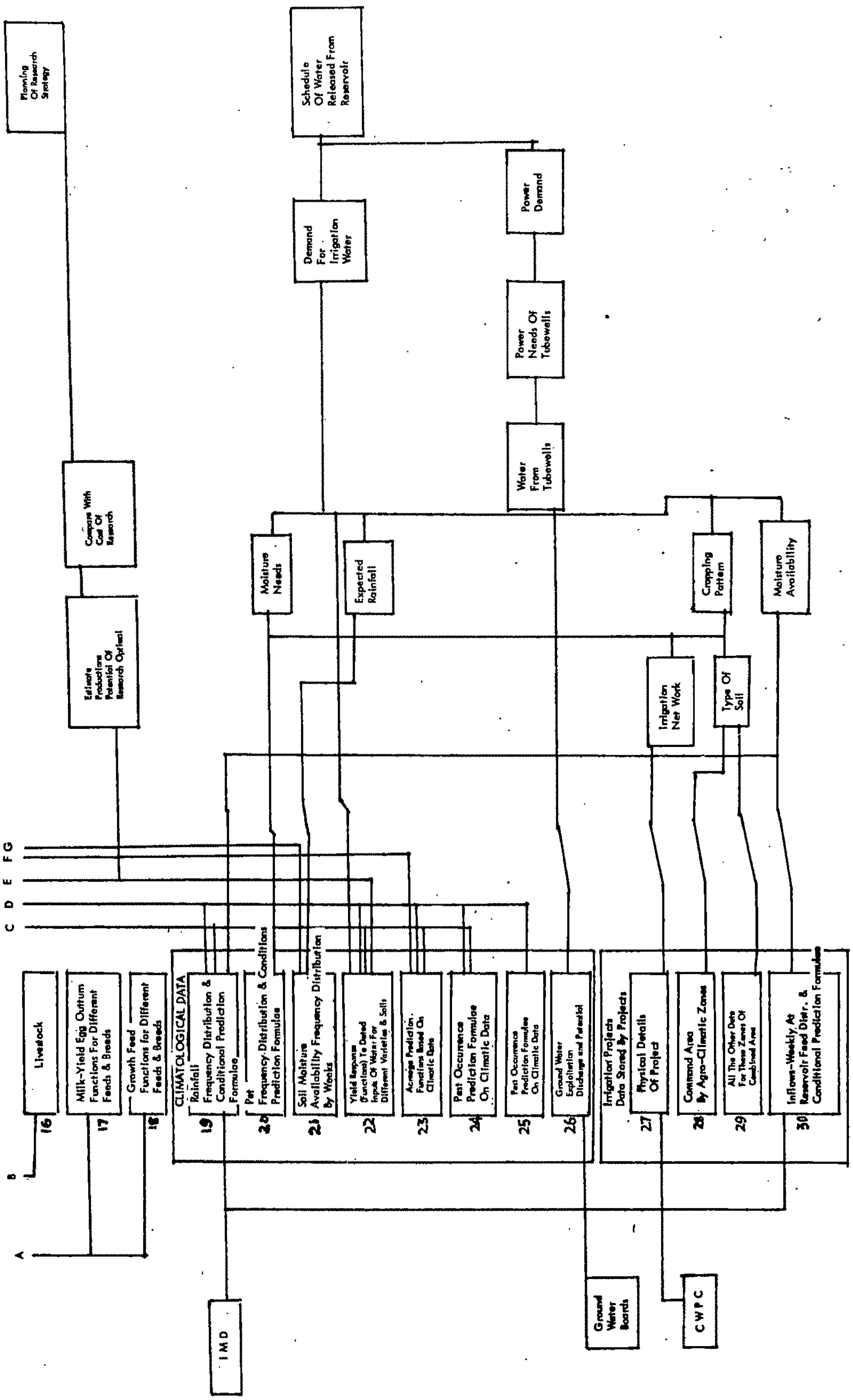
Planning Of Research Strategy
Schedule Of Water Released From Reservoir
Power Demand
Demand For Irrigation Water
Power Needs Of Tubewells
Water From Tubewells
Compare With Cost Of Research
Estimate Production Potential Of Research Optical
Moisture Needs
Expected Rainfall
Cropping Pattern
Moisture Availability
Irrigation Net Work
Type Of Soil
G
F
E
D
C
B
A
Livestock
16
Milk-Yield Egg Outturn Functions For Different Feeds & Breeds
17
Growth Feed Functions for Different Feeds & Breeds
18
CLIMATOLOGICAL DATA
Rainfall Frequency Distribution & Conditional Prediction Formulae
19
Pet Frequency Distribution & Conditions Prediction Formulae
20
Soil Moisture Availability Frequency Distribution By Weeks
21
Yield Response (Functions) To Dated Inputs Of Water For Different Varieties & Soils
22
Acreage Prediction Functions Based On Climatic Data
23
Pest Occurrence Prediction Formulae On Climatic Data
24
Pest Occurrence Prediction Formulae On Climatic Data
25
Ground Water Exploitation Discharge and Potential
26
Irrigation Projects Data Stored By Projects
Physical Details Of Project
27
Command Area By Agro-Climatic Zones
28
All The Other Data For These Zones Of Combined Area
29
Inflows-Weekly, At Reservoir Feed Distr. & Conditional Prediction Formulae
30
IMD
Ground Water Boards
CWPC

Table 1: Summary of Data Availability

Data (1)	Basis (Organisation)* (2)	Detail (3)	Volume (4)	Frequency of Collection (5)	Form in which to be stored (6)	Updating frequency (7)	Limitations of Data (8)
1. Crop Area	Mostly Census Partly Sample (DES)	Area denoted to different crops Plot wise Village wise Tehsil wise District wise (Published)	70 million holdings 55 " villages 5000 tehsils 350 districts	Every season	Grouped by Agro-climatic zones based on Districts in stage 1 Tehsils in stage 2 Villages in stage 3	Every season	Treatment of mixed crops is not uniform in the country. Intensity and quality of Irrigation not differentiated.
	Sample Basis Timely Reporting System(DES)	"	20 percent of above	"	"	Middle of every season	"
	Sample Basis Improvement of agricultural Statistics-IAS Scheme(IES)	"	10000 villages a year	"	"	Every season	Carefully collected data u[illegible] 1971
• Yield and Production	Sample of crop cutting experiments (IES)	Yield/hectare of different crops	150,000 cuts a year	Every season	Frequency distribution of yields, of different crop varieties in difft. agro-climate zones.	Every season	Upto 1971-72 there are two sets of unreconciled estimates due to difft. treatment of mixed crops. Only one estimate since then.
	Sample Basis IAS Scheme (NSSO)		30,000 cuts a year	"		"	
Soil Resources	Sample Survey (ICAR)		1300,000 samples a year	Every season	Area of different soil types in each zone	Every season	Does not fully cover the country
• Adoption of New Technology	Sample Survey (IARS), (PEO) (MOA, FAI)	Area unless HYV Pesticides used etc. Fertiliser applied	50,000 farmers/ year	Periodic	Area under difft. Varieties in the zone; Freq.-Distribution of fertilizer dosages, amount of pesticides etc. applied to difft. crop varieties in each zone.	Periodic	Sample size two small to get detailed regional data. Fertilizer data based on distribution and changes in stocks are not accounted for HYV data.

Data (1)	Basis (Organisation) (2)	Detail (3)	Valume (4)	Frequency of Collection (5)	Form in which to be stored (6)	Updating frequenc (7)	Limitations of Data (8)
						Based on distribution and not consumption and distribution dces not cover HYV seeds grown by farmers.	
Sample IAS Scheme(NSSO)	Agricultural practices	30,000 fields a year	Every year	"	Every year		
Selected districts (DES)	Area under HYV	30 to 35 districts/ year	"	"	"		
Input-Output relationship for crops	Experimental Schemes (ICAR, Agricultural Universities) IAS Scheme (NSSO)	For different crop varieties yield response to -fertilisers -micro-nutrients -cultural practices -soil type, structure -irrigation	30,000 plots a year	Every season	Estimated crop-wise variety wise yield response functions for difft. years grouped by agro-climatic zones.	Every season	Not all crops and all areas are covered. Water-yield relationship experiments almost absent Responses in experimental plots not representative of responses on farmers fields.
Cost of Cultivations	Farm Surveys and Comprehensive Scheme (DES)	Daily Cost and amount of inputs on the different plots of selected households	More than 7000 households per/ year. Monthly summarises alone need 5 million cards/year	"	Estimated Out-put cost functions for different crop varieties for different years grouped by agro-climatic zones.	"	Data not yet available for all crops and states.
Prices (a)wholesale	Market intelligence(DES)	Daily/Weekly Market prices, wholesale and retail prices	About 1000 Markets and 72 commodities	Weekly	Frequency distributions of prices over the year. Price forecast functions		
(b)retail	"	Retail prices of foodgrains and other essential commodities	100 markets	Weekly	"		
(c)Harvest	"	Farm Harvast prices.	All districts	Weekly			

Data	Basis (Organisation)	Detail	Volume	Frequency of Collection	Form in which to be stored	Updating frequency	Limitations of data
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
8. Market Arrivals/ disposals	Market intelligence (DES)	Daily/Weekly data	1000 markets	Weekly	Frequency distibution of weekly data	Every year	
9. a) Land Holdings and Tenancy	Agricultural Census (ACC)	Households Holding size, Tenancy status irrigation facility	70 million holdings	Periodic (every 10 years) (every 5 years on a sample basis)	Distribution of size of holdings by irrigation, soil type and agroclimatic zones	Whenever new data are available	
	Periodic Sample Surveys (NSSO)	"		Regularly, every year(?)	"		
(b) Income	Sample Surveys (NSSO)	Households Income Consumption Savings Employment	30000 households/ year consumption survey in recent years	Every year	Distribution of incomes employment, savings consumption nutritional level by agroclimatic zones.	Every year	
10. Animal Husbandry	Livestock Census(DES)	Livestock size and age composition by households	550000 villages	Every 5 years	Distribution of livestock etc. by agro-climatic zones	Every 5 years	Data on quality or breed of livestock not available.
Milk, Eggs Wool and Meat	Sample Surveys (IARS), (NSSO) (Annual Husbandry Division of DES)	Livestock products		Periodic Every year	Distribution of production of different breeds Animal Performance histories		
Input-Output relationship for livestock products	Experimental schemes (ICAR)	Yield of diffirent species to different feeds etc.	/year	continuing experiments	Estimated yield response, functions for animals of different brreds age etc. to different feeds in different climates	As and when new data are available	Inadequate experiments to derive yield functions.
1. Machinery Implements	Census (part of livestock census) (DES)	Ploughs, carts, crushers oil engines pumps etc. for households	550000 villages	Every 5 years	Distribution of households by size class of holdings and implements by agroclimatic zones	Every 5 years	Quality data on implements not collected.

Data	Basis (Organisation)	Detail	Volume	Frequency of Collection	Form in which to be stored	Updating frequency	Limitations of Data
1	2	3	4	5	6	7	8
	Sample(part of agricultural census) (NSSO)	"					
Investment and Credit	Rural Surveys (RBI)	Credits advanced for difft. purposes, investment made		Periodic		Periodic	Surveys are not regularly conducted for data on investment from farmers own resorces.
Fishery	Sample Basis (CMFRI)	Catch of marine fish variety, duration, type of equipment		Every year		Every year	No reliable data on inland fishing
	(NSSO)	Catch of inland fish		Occasional		Occasional	
3. Forestry	Survey (DES-MOA)	Area Volume of standing timber and firewood and outurn of various products		Every year		Every year	Data from only govt. forests available Production functions for different bio-systems not available.
14. Climatological Data							
(a) Rainfall	Observation network (IMD)	12 hourly rainfall	4000 stations nearly 100 year series for many station	Every day	All data AND weekly frequency distribution of rainfall by agroclimatic zones	Every year	
(b) Pan Evaporation and other determinants of evapotranspiration	"	12 hourly readings		"	All data AND frequency distributions of PET by agroclimatic zones/stations	"	Pan Evap. network is too coarse.
(c) Consumptive use of water	Lysimetric observations network (IMD)	daily readings of soil moisture, PET and actual ET	200 stations	Every day	For different crops yield response to dated inputs of water at different stations.	"	Only a short time series available

Data	Basis (Organisation)	Detail	Volume	Frequency of Collection	Form in which to be stored	Updating frequency	Limitations of Data
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(d) Yield and Climate	Experimental Farms (IMD)	daily readings on crop growth and weather Parameters	50 centres 30 years data	Every day	For different crops yield response to different climates at different stations.	"	
Irrigation							
(a) Irrigation Projects Physical data	Project reports (CWPL)	Reservoir capacity etc. Canal Network Command Area		Whenever a project is completed	Command area by agro-climatic zones and Canals		
Water inflows	observations (CWPC)	Acre feet/day		Every day	Frequency distribution of inflows for different weeks. Prediction formulae.	Every year	
(b) Water Availability in rivers	observations network (CWPC)	Thrice a day water levels Discharge per day	1003 gauges 1862 gauge discharge sites many years data	Every day	Frequency distribution of inflows for different weeks Prediction Formulae	Every year	Long Time series not available for all rivers
(c) Ground water availability	Survey (GWB)	Water Table	-	-	Potential of ground water by agro-climatic zones/districts/Tehsils	"	Incomplete coverage
Ground water exploitation	- (STO's)	Tehsilwise Tubewells by types	-	Every year	Use of ground water by agro-climatic zones/districts/Tehsils	"	Incomplete coverage

Table 1 (Contd.) footnote

*(DES)	Directorate of Economics and Statistics, Ministry of Agriculture
(ICAR)	Indian Council of Agricultural Research
(PEO)	Programme Evaluation Organization, Planning Commission
(MOA)	Ministry of Agriculture
(ACC)	Agricultural Census Commissioner
(IARS)	Institute of Agricultural Research Statistics
(CMFRI)	Central Marine Fisheries Research Institute
(CWPC)	Central Water and Power Commission
(FAI)	Fertiliser Association of India
(NSSO)	National Sample Survey Organisation
(RBI)	Reserve Bank of India
(IMD)	India Meteorological Department
(GWB)	Ground Water Board
(STO)	State Tubewell Organization

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INDIAN AGRICULTURAL DATA AND INFORMATION

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0 *Scope of Agricultural Information*

The problem of agricultural information is a very complex one. Due to population pressure, agricultural information is also getting more and more importance as we are in the process of modernising our traditional agriculture into an industry.

Users of this information are of diverse groups. On one hand we have highly specialised research workers, and on the other hand we have illiterate farmers, who have inherited the traditional skills and want to learn or are to be educated on the modern skills. In between we have technical personnel, administrators, bankers businessmen, industrialists, extension workers, skilled and semi-skilled workers, etc.

We are trying to look in this article at various institutions, organisations, societies, etc., where information is generated or received, stored and disseminated in various forms.

We are fully aware that we have to cover a very large area and can only touch on the fringe of the problem. Within the short available time, we have gathered some information which may be of interest to the gathering of specialist assembled here. We have attempted to present the available information about Indian data, and have briefly stated about the international information sources.

1 *Statistical Information: All India*

1.1 At the Centre, the Directorate of Agricultural Economics and Statistics is the most important organisation devoted to this work. It collects, collates and disseminates various types of information on agriculture. This is done by this organisation by way of publishing a number of periodicals and other related publications.

The subjects covered by this organisation encompass a large number of agricultural aspects, some of which are given below:

Indian Agricultural statistics, Agricultural prices, Commercial crop statistics, Indian forest statistics, Estimate of area and production of principal crops, Agricultural wages, Indian livestock census, Food statistics,etc. It also covers Studies in the economics of farm management, Agricultural legislation,etc.

1.2 *Fertiliser Statistics (Annual)*

The Fertilizer Association of India publishes this annual by compiling data from various governmental sources and industry. This incorporates scattered, published as well as unpublished data, about fertilizer and its related aspects. It compiles detailed statistical data regarding production, raw materials, imports, distribution, consumption, summary tables, prices and subsidy of fertilizers. The Association also includes in its statistical compilation data pertaining to soil testing, soil nutrients and their utilisation, index number of crops, agricultural production and productivity, area and production, imports and storage of food grains, population and agricultural economy and world's statistics of fertilisers and agriculture, etc.

1.3 *Census Reports*

The value of various census reports needs no elaboration as a data source of information. The various publications issued for the 1961 census, and the new reports coming out of the 1971 census, form a very valuable source of data for agriculture.

1.4 *Agricultural Census*

The agricultural census was conducted in order to make a complete enumeration for the 1st time with 1970-71 as the reference year for the purpose of participating in the 'Third Decennial World Agricultural Census' sponsored by FAO of UN. This census would provide data on the structure of agricultural holdings, and their main characteristics viz., number and size distribution of operational holdings, area under principal crops, land utilisation statistics, irrigation, tenure and tenancies, etc. The field work and tabulation of data on the project has been completed and statewise reports giving the census results have been prepared. The consolidated draft of All-India report will be shortly released after the secrutiny of technical experts in the field.

1.5 *Export & Import*

The Department of Commercial Intellegence and Statistics of the Government of India compiles, maintans and publishes the data pertaining to export and re-export and import of various commodities of India. The agricultural commodities are also covered. It publishes the 'Monthly Statistics of Foreign Trade in India'.

1.6 *State Level Statistics*

One of the most important publications issued by the States in the country relates to 'Season and Crop Reports'. These are compiled and published by their Departments of Statistics, Bureau of Economics or similar other organisations. Various agricultural universities are also publishing handbooks, etc. in which information about statistical data on agriculture for the individual State is given.

It is not possible for us to deal elaboratively on this aspect here. But the following 2 publications are worth mentioning which give details of statistical sources.

Bansel, P. C.: Agricultural Statistics in India, Dhanpat Rai & Sons,
Jullundur, 1970

Ministry of Food & Agriculture, Directorate of Economics and Statistics: Guide to Current Agricultural Statistics, 1954.

2 *Research & Teaching*

At present, in India research, teaching and extension activities are being done by various agencies. In research field, the ICAR is the apex body. It has over 24 research institutes under its administrative control, supports over 20 agricultural universities and also sponsors and supports about 80 All-India Coordinated Projects of Research in the country. There are 105 colleges of agriculture, animal husbandary, veterinary and dairy science and agricultural engineering in the country. Many of these colleges are attached with agricultural universities. In addition to these there are some independent State research institutes,etc. Some institutes under CSIR complex are also conducting research on plant and animal sciences. At BARC, research on nuclear energy in relation to agriculture is being done. Surveys, like Botanical Survey of India, Zoological Survey of India and Geological Survey of India carry out surveys and publish information, which is of interest to agricultural scientists. The Central Water & Power Commission, the India Meterology Department and general universities also conduct research, which is of interest to agriculture. Apart from these, we have the Indian Standards Institution and the Patent Organisation, which have standards and patents of agricultural interest.

Information and data, which is either generated or is of direct interest to research workers in the field of agriculture is given below:

2.1 *Projects of Research*

The projects of research carried out by research institutes get listed generally in their annual reports. Very few reports, however, are up-to-date. Recently INSDOC has compiled and published 'Current Research Project in CSIR Laboratories 1972'. This list covers 1925 current projects of research in 39 organisations under CSIR. INSDOC has also compiled and published information about the projects of research in science and technology in Indian Universities and research organisation. It includes 9, 908 projects out of which 3374 are on agriculture. The Research Project Unit of ICAR maintains the file of research projects in the ICAR system and agricultural universities. About 5,400 projects of research have been listed by this unit.

If similar information is compiled and published by the various agencies like the Atomic Energy Commission and other public and private sector R & D organisations it will be a great asset for the scientific community in our country. They will be able to avoid duplication of research and establish contacts with scientists working in their areas of interest.

2.11 *National Index of Field Experiments*

The Institute of Agricultural Research Statistics maintains data on field experiments conducted throughout the country. It has already published data for centre as well states about these for the years 1948-53 and 1954-59. It also maintains further data on these experiments. As and when more sophisticated computer facility is available it will be computerising data for retrieval of information on demand.

2.12 *All-India Coordinated Research Projects*

Coordinators of the ICAR All-India coordinated projects maintain data on the various projects, which are accepted by the All-India Workshops on various crops. They also maintain retrospective data about the projects.

2.2 *Output of Scientific Papers in India*

The output of scientific papers, published in the scientific journals are, currently monitored for publishing abstracts, indexes and for building up of of information files. It is estimated that at present there are 8000 to 9000 contributions in agrobiological area on plant sciences.

INSDOC publishes the Indian Science Abstracts' which has listed in 1972, 13404 abstracts of papers on science and technology.

IARI Library: It scans more than 350 Indian and 500 foreign periodicals and indexes more than 8000 papers annually, contributed by Indian and foreign scientists on Indian agriculture and related subjects. This activity was started in 1944 and has continued till date without break. The library has built a collection of more than 45,000 references in its Indian Agriculture Reference Media for retrospective literature search. The subject part of the media is kept in classified order according to UDC scheme and author part in the alphabetical order of the author's name.

Wealth of India: For this project, Indian as well as foreign periodicals are scanned and an information file has been maintained according to genera and species of plants and on animal sciences, minerals and industries under the popular names. The project has about 200,000 references in its file.

2.3 *News Paper Cuttings*

The information published in newspapers relating to agriculture is of interest to workers engaged in sociology and economics of agriculture. Some of the important agencies who monitor and keep data are:

1) Delhi Library Association: Publishes Indian Press Index.

2) 'The Data India', is published by Press Institute of India.

3) United News of India, publishes annually 'Aspects of Agriculture in India'.

2.4 *Books & Monographs*

A complete retrospective bibliography of publications of interest to the agrobiological subjects in India is not available. Information gathered from a few sources gives some data about it.

a)	CSIR: Indian Scientific & Technical Publications Exhibition, Bibliography, 1960	English Book = 1200 Indian Languages = 534
b)	CSIR: Indian Scientific & Technical Publications Bibliography (1960-65)	
c)	Books in Print,India (1973)	1357
d)	Bibliography of ICAR Publications	947
e)	Indian Books 1974-75: Annual bibliography	350 of agricultural interest.

2.5 *Germplasm Collection*

A national collection of germplasm for seed varieties of various crops is likely to be maintained when the Plant Introduction and Explanation Organisation is established.

At present, various ICAR institutes and agriculture universities are maintaining the germplasm collection. The Genetics Division of IARI maintains germplasm collection for wheat, pulses and maize. Central Rice Research Institute for rice and similarly various single crop research institutes maintain germplasm of the crops they specialise. The ICRISAT is maintaining germplasm on sorghum, millet, chick pea & pigeon pea. Plant introduction Division, IARI maintains in medicinal plants, etc.

Vegetable Crops

The vegetable coordinator at IARI maintains information about vegetable germplasm collection of varieties released and the new varieties under trials. At present, the information is maintained on 14 out of 45 and odd number of vegetables grown in the country.

Fruit Register

For various new varieties of fruits released in the country, the Horticulture Division of IARI maintains the register. The retrospective data on the released varieties is also compiled by this Division.

It is likely that a computerised information service, linking various germplasm collections with the assistance of FAO at international level, may be started very soon.

2.6 *Insect Collections*

There are about four million estimated number of species of insects in the world and more than one million estimated number in India. Out of one million 50,000 species have been identified and the collection of specimens are maintained at 3 centres in India. Zoological Survey of India, Calcutta, maintains a collection of 26000 species, Forest Research Institute, Dehra Dun has a collection of about 17000 species, and Indian Agricultural Research Institute is maintaining a collection of 15,000 insect species. A comprehensive scheme has been recently formulated for insect identification wherein the three centres will participate.

2.7 *Fungi*

Traditionally, IARI has done the pioneering work on preservation, identification, classification and researches on fungi, right from the time of Butler till date. Today, it has built a collection of world fungi consisting of 31000 total number of specimens under 'Herbarium Cryttogamae Indiae Orientalis' (H.C.I.O.).

Indian type culture collection of fungi was started in 1936 at IARI with a view to furnish authentic culture of fungi for teaching, demonstration and research purposes. At present, the culture collection consists of about 1300 cultures of fungi including phytopathogenic fungi, moulds, yeasts and edible fungi.

2.8 *Nematodes*

The importance of nematodes as serious pest of crops has been recognised hardly four decades back. It is estimated that today more than 100,000 species of nematodes exists out of which nearly 11,500 species have been identified and described. In India, more than 600 species of soil and plant parasitic nematodes have been identified, out of which 270 species of plant parasitic nematodes have been described. There are five major centres for nematode collection, two in USA, one each in Netherland, U.K. and India.

The Indian Centre is located at IARI under the name of National Nematode Collection, IARI for South East Asia region. This centre has 914 type slides for 167 species and also 2404 permanent identified slides of 240 species. G.B. Pant Agricultural University, Pantnagar has recently compiled the list of nematodes.

2.91 *Botanical Survey of India*

The BSI with its headquarters at Calcutta and 5 circles located in various parts of the country surveys the flora of India and revises the Hooker's Flora of British India. It also maintains the Central National Herbarium and Indian Botanic Garden. The survey provides assistance and guidance for development of horticulture, agriculture, arboriculture, forestry, trade and commerce. The Survey also helps research scholars in their research projects on botany by supplying information and materials free of cost.

The up-to-date data pertaining to Central National Herbarium and Indian Botanic Garden is not available.

2.92 *Zoological Survey of India*

This survy like Botanical one, has its headquarter at Calcutta and seven central regional stations located in various parts of the country. The headquarter and the stations carry out intensive field survey of various regions in order to enrich the National Zoological collection of the country, maintained at the headquarter. The survey maintains latest information on national zoological collections including insects. It procures fullest possible information about systematics, ecology and zoo-geography of the country and animal systematics.

2.93 *Wealth of India*

This encyclopaedic work gives information about Indian economic plants, animals, minerals and industries. Amongst the economic plants it is covering over 1900 genera, on each species location, uses and various other economic aspects of plants, are given. The articles are written by carrying out a very comprehensive literature search. This compendium is very important source of information on economic plants of India. The first volume was published in 1948 and the last volume is likely to be published in 1976.

3 *Agricultural Libraries*

The specialized libraries play a very important role in providing information to scientists by building good collections of books and monographs and serials. Various ICAR institutes and agricultural universities have excellent libraries. The recent ICAR library survey has shown that over 600,000 volumes are available with ICAR institutes and agricultural universities have more than 800,000 volumes. Catalogue of these libraries are excellent information retrieval tools, some of the libraries like IARI have over million entries in the catalogue. CSIR system libraries have also over 600,000 volumes according to a survey by INSDOC.

3.1 *Serial Catalogue*

Fourteen serial catalogues of various libraries and regions have been published by INSDOC. Some of the agricultural university libraries and ICAR research institutes have also brought out the serial catalogues of their individual libraries and their total number comes to eleven.

4 *Other Information and Data*

In addition to the information given above, information about some surveys and other organisations in India is given below:-

4.1 *Seeds*

On the basis of research conducted by All-India Coordinated Research Project, new varieties of seeds are released by ICAR. The Coordinators of All-India Coordinated Research Projects maintain data on quality and yield etc. about all the seed varieties of crops released.

National seed corporation in collaboration with State Seed Corporations and State Farm Corporation of India looks after the production and distribution of seeds to farmers.

4.2 *Soil Survey*

The All India Soil and Land Use Survey carries out scientific survey and classification of the soils of the country. This is essential for proper understanding of the kinds of soils and for their exploitation to maximum advantage through planned land use on national basis. The object of soil survey is to classify and map the different kinds of soils with a view to plan properly the management and agricultural use of the soil resources.

Soil survey has so far issued various survey reports with maps. It maintains and up dates the data pertaining to the surveys it carries out. The soil survey has so far covered 27% land of the country.

4.3 *Soil Fertility Map of India*

Soil fertility map of India has been prepared by the coordinating unit of the Soil Science & Agricultural Chemistry Division of IARI. The map published in 1969 has been prepared by analysing over 1.3 million samples of soils. It covers 225 districts out of the total 325 in the country. These maps are useful in interpreting the relationship between soil groups and soil fertility classes Data on them is maintained by this unit.

4.4 *Central Ground Water Board*

It is now the apex scientific body at national level to look after all aspects of exploration, assessment, and development of ground water resources in the country. It also maintains related data.

4.5 *Pesticides*

Role of pesticides lies in providing an umbrella against the ravages caused due to pest out breaks. The Pesticide Association of India maintains information about progress of basic manufacture of pesticides in India. This includes insecticides, fungicides, rodenticides, herbicides, and nematicides. It also keeps information about import of these commodities in India.

4.6 *Machinery*

Information of commercial interest like production, distribution etc. of agricultural machinery and implements is maintained by the Ministry of Agriculture. The Agricultural Machinery Manufactures Association is also maintaining information.

The Machinery and Agro-Industries corporations in various states are probably maintaining data at the local level.

4.7 *Meteorology*

The Metereology Department carries out all the observations on meterology. They are bringing out various publications including periodicals and cummulations like "Monthly and Annual Rainfall and Number of Rainy Days 1901-1950".

It has a Division on Agricultural Meterology which collects information of agricultural interest and acts as an information centre for this purpose. It also maintains various data, some of the topics covered by it are evapotranspiration from crops, evaporation from soil, practical soil moisture problems in agriculture, soil temperatures at various depths, influence of weather on crops in general, crop weather studies, crop weather calender, forecast for farmers, crop out put etc.

4.8 *Directorate of Marketing and Inspection*

Data on marketing of agricultural commodities is collected and published by this organisation. It has excellent library devoted to this type of data.

4.91 *The National Commission on Agriculture*

The Commission has published over 21 interim reports on various aspects of agriculture, which embodies mine of information. It has collected enormous first hand data on various facets of agriculture. The final report when published by this commission, will be standard reference work on all aspects of agriculture for time to come.

4.92 *Other Agencies*

There are still many more organisations devoted to various other aspects of agriculture in our country, which we could not cover due to shortage of time, like irrigation, farm finance, storage, food technology, agro industries etc. etc.

5 *Dissemination of Information to Farmers*

Since agricultural activity is distributed over a very large section of the society throughout the country, the dissemination of information of agricultural importance is very vital, specially to farmers. This has been recognised and various agencies are operating in this area. The Department of Community Development, Department of Cooperation, and the Directorate of Extension, agricultural universities and ICAR institutes etc. are involved in this process.

5.1 *Nature of Information to be Communicated*

The results of research on aspects like new seed varieties, fertilizers, pesticides, storage problems and marketing etc.; similar problems relating to animal husbandry, dairy and veterinary and fisheries and availability of credit facilities etc. are to be communicated to farmers.

5.2 *Media Used*

A number of diversified media of communication is used like printed information in the form of books, pamphlets, charts; audiovisual media namely, radio, television etc.; personal communication media like national demonstration centres, Krishi Mela, scientists and gram sevak's visits to villages and discussion with farmers.

6 *International Sources of Information*

At the International level, there are various agencies and organisations which are involved in collection and dissemination of information on agriculture. The most important one is the Food and Agricultural Organisation of United Nations.

6.1 *FAO*

Its Statistical Division is a prolific compiler, which collects, collates and disseminates numerous statistical data publications on various aspects of agriculture. It includes periodicals, annuals, bulletins, monographs and reports. FAO also publishes the 'World Census of Agriculture'.

6.11 *Aglinet*

The FAO is linking various important libraries in the world under the AGLINET system. This network will be a very useful source for obtaining documents or copies of documents from libraries by scientists in the world on any aspect of agriculture.

6.12 *AGRIS*

The FAO has sponsored a net work of agricultural information agency in the world under the name of AGRIS (World Agricultural Information System).

AGRIS has two levels of activity. At level one, it is publishing the AGRINDEX by getting the input of research papers from various countries of the world. AGRIS level two will involve information pertaining to research projects and other data of agricultural interest.

6.2 *Commonwealth Agricultural Bureaux*

The abstract journals form one part of the range of services in agricultural sciences provided by the CAB and provides a total of well over 100,000 abstracts and citations each year. They constitute one of the comprehensive coverage of the world literature on agriculture and related sciences. The CAB is subsidised by the contributing countries. From 1972, the abstracting journals are being produced by computer techniques and a consolidated data base is being created from which new services will be developed. Most journals are being issued monthly. In due course of time, all data will be available on magnetic tapes.

The CAB currently publishes 19 abstracting journals in agrobiological subjects.

6.3 *National Systems of Information*

In addition to international information generating and monitoring sources, there are a number of national centres in the countries of the world. The Agris has made a survey of such centres and published various reports. We are briefly describing here a few important ones in USA, USSR and France.

6.31 *U.S.A.*

In U. S. A., the approach for information monitoring is decentralised. Various setups like the Chemical Abstracts, Biological Abstracts etc. exist. The National Agricultural Library compiles the Bibliography of Agriculture and the Medical Library complex publishes the 'Index Medicus.' The Atomic Energy Commission publishes the Nuclear Science Abstracts. Various committees have surveyed the national information activity in science and technology in U. S. A. There are a number of federal computer based information system in USA out of which the following two maintain information about current research projects (1) U. S. Department of Agriculture has the 'Current Research Information System (CRIS)' covering research efforts of 6 USDA agencies, 53 state agricultural experiment stations and 25 other cooperating state institutes. At the moment, it has nearly 28,000 projects of research listed. (2) The Science Information Exchange (S. I. E.). This covers the ongoing basic and applied research in science and technology. Currently, it has over 800,000 documents of research projects 100,000 documents of research project are added annually. MARC tape of Library of Congress is well known to this audience.

6.32 *U.S.S.R.*

In USSR, the information processing is centralised to a great extent. The Institute of Scientific Information of Academy of Sciences of USSR was contemplated in 1952 and was converted into 'All-Union Institute of Scientific and Technical Information in 1956 (VINITI). At present, it publishes the Referativnyi Zhurnal in 25 series and in 33 parts, monitoring over a million items of information.

In addition to this the VINIMI publishes the Medical Abstracts Journal in 13 different series, CINI is monitoring information on building and architecture.

The VINITISH (1965), the All-Union Institute of Scientific & Technical Information on Agriculture is responsible for information on agricultural subjects. This is currently offering abstract cards in some 43 subjects in agriculture which is replaced by Referativny Zhurnal in Agriculture from 1969. In addition they have an Express Information Service.

The Central Library of the Ministry of Agriculture Publishes a 'Monthly Index of Agricultural Literature' of the USSR listing over 60, 000 titles in a year. In addition a bibliography of foreign agricultural literature is also published listing over 30, 000 entries.

6. 33 *France*

Centre National de la Researche Sciencfique (CNRS) was started in 1939. They publish the 'Bulletin Signaletique' in seventeen parts. In addition to this six others are published on human sciences. It now includes over 500, 000 references per year.

7 *Information Network in India: NISSAT*

We are meeting here to discuss about the national information system. We have outlined the various data sources in agriculture in this article. If a computer based system for agricultural information retrieval is to be set up, many of the above mentioned data will have to be scrutinised and essential ones may have to be incorporated in the system.

The role of IARI Libary in the Network

We feel the Library with its resources and facilities can play a very vital role in the information network, and its Bibliography of Indian Agriculture, when published, will be a source data for incorporating in the AGRIS and National System.

TOWARDS THE EVOLUTION OF AN INFORMATION SYSTEM FOR NATIONAL WATER RESOURCES EVALUATION, DEVELOPMENT, MANAGEMENT AND PLANNING

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1 *Introduction*

The Central Water Commission (C.W.C.) has a pivotal role to play in the assessment, planning, development and management of national water resources. The C.W.C. has the general responsibility of initiating, co-ordinating and furthering, in consultation with the State Governments concerned, schemes for the control, conservation and utilization of water resources throughout the country for purposes of flood control, irrigation, navigation and water power generation. One of its functions is to oversee the collection of hydrological data and arrange for their compilation, scrutiny, tabulation, processing and analysis. Data on the physical and operational characteristics of irrigation projects and their financial aspects are also compiled. The Commission acts as the national clearinghouse in respect of these data. Each type of basic data requires to be developed into a national information system.

2. Hitherto these data are mostly being stored in the conventional manner and retrieved manually. Since long term data are required by the Central Water Commission, Planning Commission and other data users for planning and development of irrigation and power, there is a need to preserve the data over a long period of time. Preservation of data in files over years becomes exceedingly difficult as a prohibitively large amount of storing space is required. Moreover the data files get torn with the passage of time resulting in the mutilation of data. The processing of data manually is slow and not very efficient. The retrieval of such data takes considerable time and involves errors of copying, etc.

3. For rapid and accurate processing and retrieval of large bodies of data the only solution is the use of electronic data processing system. Though the facilities of electronic data processing available in different organisations have been availed of in a limited way for producing water yearbooks and analysis of the data, the work did not make headway to the desired extent because of the lack of personnel and the difficulties of getting sufficient computer time from the computer centres. With the growing realisation of the need for comprehensive and efficient information systems in the water resources sector as an integral part of the agricultural and natural resources information system, efforts are being made with the help of the Electronics Commission to secure the requisite computer facilities to meet the challenge. The Electronics Commission have proposed a UNDP project for the National Informatics Centre

(NIC). The NIC will have a large regional computer and terminals will be provided to some of the Government departments participating in developing information systems in the field of agriculture (including irrigation), science and technology.

4. Streamflow, water levels, suspended sediment and water quality are the most important parameters used to measure and quantify the surface water resources for both resources planning projects and management activity. The system relating to the streamflow and water levels is discussed here.

There are about a thousand sites where river water levels (stages) are observed (three times a day) and there are over 1800 sites where river water levels and corresponding rate of flow of water (stage-discharge) are observed daily. For some sites data are available from the period as early as 1890. From the hydrological point of view long term data are extremely valuable and need to be preserved. These data are observed by State Government agencies, units of C.W.C. spread over the country and some other agencies. Out of these the data of about 300 sites are being collected, scrutinised and processed by C.W.C. Water yearbooks are also published for some river basins. The ultimate aim is to store, scrutinise, update, process and retrieve the data for the entire country so as to make them readily available for further analysis and research. A data system has to be made alive and responsive to the needs of the engineers, research scientists and Government authorities by providing in time all the information available that has a bearing on a particular problem.

5. A schematic description of the major elements of the information system for storage, processing and retrieval of hydrological data is given in Fig. 1. These elements are briefly discussed in the following paragraphs.

6 *Data Transmission*

The methods of transmission of data have to be improved upon to make the flow of data from various agencies to the Directorate of Statistics of C.W.C. smooth and within the scheduled time. The forms for recording of stage and stage-discharge will be standardized to make them suitable for coding and punching directly. Due to multiplicity of agencies, and since the sites are spread over the entire country, data compilation is a time consuming task. Data are observed at a site and transmitted mostly by post to the sub-divisional office where computations are done and records are maintained. The S.D.O. further transmits these data to its head office from which data are forwarded to the C.W.C. At present there is no time limit within which data must be transmitted to CWC. A suitable deadline will have to be set for the despatch of data if the data are to be made available to users in time.

7 *Pre-punching Scrutiny*

The data received in the Directorate of Statistics will be subjected to broad mannual scrutiny for incompleteness, duplication and consistency. The concerned data recording agencies will be contacted for missing data and the discrepancies detected. The data will then be coded and made suitable for rapid and accurate punching by addition of suitable directions where necessary.

About three lakhs of punch cards will be required to transfer the data of all current sites for a period of one year. It is roughly estimated that the number of punch cards required to transfer all the data of earlier periods would be of the order of 6 million.

8 *Storing and Processing of Data*

The data on punch cards will be transferred to magnetic tapes since on account of cost and other considerations, a magnetic disc is not likely to be available in the near future. The data files will have to be arranged sequentially. All data of a site will be arranged in time series and the sites will be grouped according to basin, tributary and sub-tributary. Stage and stage-discharge data will be maintained on separate files. Data of all the sites in a basin for a period of one year are also required for some studies. This is also an important sequence and master data file will be kept in this sequence. Tape layouts are not described here as the software facilities likely to be available are not finalised as yet. This system will need a programming language which is efficient both in data processing as well as in scientific applications. At present data are being transferred to magnetic tapes in card image form. From this form the data would be transferred in the desired tape layout formats. (Provisionally data for one month forms one physical record. The file in this form is currently being used for the development of scrutiny programmes, programming language being FORTRAN IV).

9 *Scrutiny and Correction*

Programmes will be developed to scrutinise the missing cards, duplicate cards, use of invalid codes, punching and other errors. The data supplying agency (D. S. A.) will be contacted for missing data and for those discrepancies which are inherent in the original data. Error messages provided by these programmes will be studied manually and correction cards file will be prepared. This file will be used to update the data file. The feed back from D. S. A. will also be used for updating the data file.

10 *Quality Check of Data*

The data file will then be subjected to various programmes which will test for the consistency and quality of the data. The functions of some of the programmes are mentioned in the following:

(a) Plotting of stage and discharge hydrographs: The stage and discharge hydrographs plotted side by side provide a means of checking possible discrepencies. If the water level rises there should normally be a corresponding increase in the discharge except in certain cases. (If the river cross-section is not stable, the relationship between water levels and discharges is likely to be disturbed after a high flood). The study of the stage and discharge of hydrographs should thus help in detecting some of the probable discrepancies.

(b) Plotting of stage-discharge relations for rising and falling periods separately: This will bring out additional discrepancies. Updating will be done accordingly.

(c) Regression analysis of Stage-discharge (S. D.) relation: The relation between S and D is of the form

$$D = a\,(S - S_0)^b$$

where S_0 is the stage value for which discharge is zero. Since direct estimation of three parameters by least square method is not possible because of involvement of S_0, the programme will choose that value of S_0 which will make the residual sum of squares minimum in the linear regression between log D and log $(S - S_0)$. Ninety-five percent confidence limits for the S. D. relation will be found. An outlier test will be applied for detecting additional discrepancies. However care has to be taken to consider the discrepancies after taking account of any shift in the control. Shift in control will be tested by the test of homogeneity of regression lines.

(d) Comparison of water levels of different sites in the same reach of river basin: Similar comparisons for stream flows of different sites will be made. Relations between water levels of different sites will be established. Similar relations for stream flows will also be established.

(e) Comparison of runoff volumes of water during monsoon, non-monsoon and the whole year of various sites in the reach will be made. These run-off volumes are expected to be consistent. These data are usually in great demand and would be readily provided, apart from being used for consistency checks.

11. By removing of all the discrepancies detected through the scrutiny programmes and corrections in the light of the explanations provided by the D. S. A. s a Master Data File is built up. This will be the basic data file for all future synthesis, analysis, computations, publication of water yearbooks, studies and research.

12 *Retrieval*

Water yearbook format will be finalised taking into consideration the needs of various data users and computer output in the water yearbook format will be brought out annually. Generalised search programmes would be developed to produce the required information in the desired formats. Some users may require all the available data for a site or sites in a sub-basin, or a basin., Some may require data relating to a particular project. Some may require data for a part of some basin falling in a particular State. Data may be required for a specified period or for the entire period for which data are available. All such needs would be kept in view in developing the search programmes.

13 *Decision Making*

Decision making enters in the system at various levels. Planning of water resources development and management depends on the available financial, water, expertise and other resources in the country. Prime decision making has to be done when water resources are evaluated and projected to future short-term and long-term periods.

14 A Sub-system on Inventory of Stage and Stage-discharge Sites

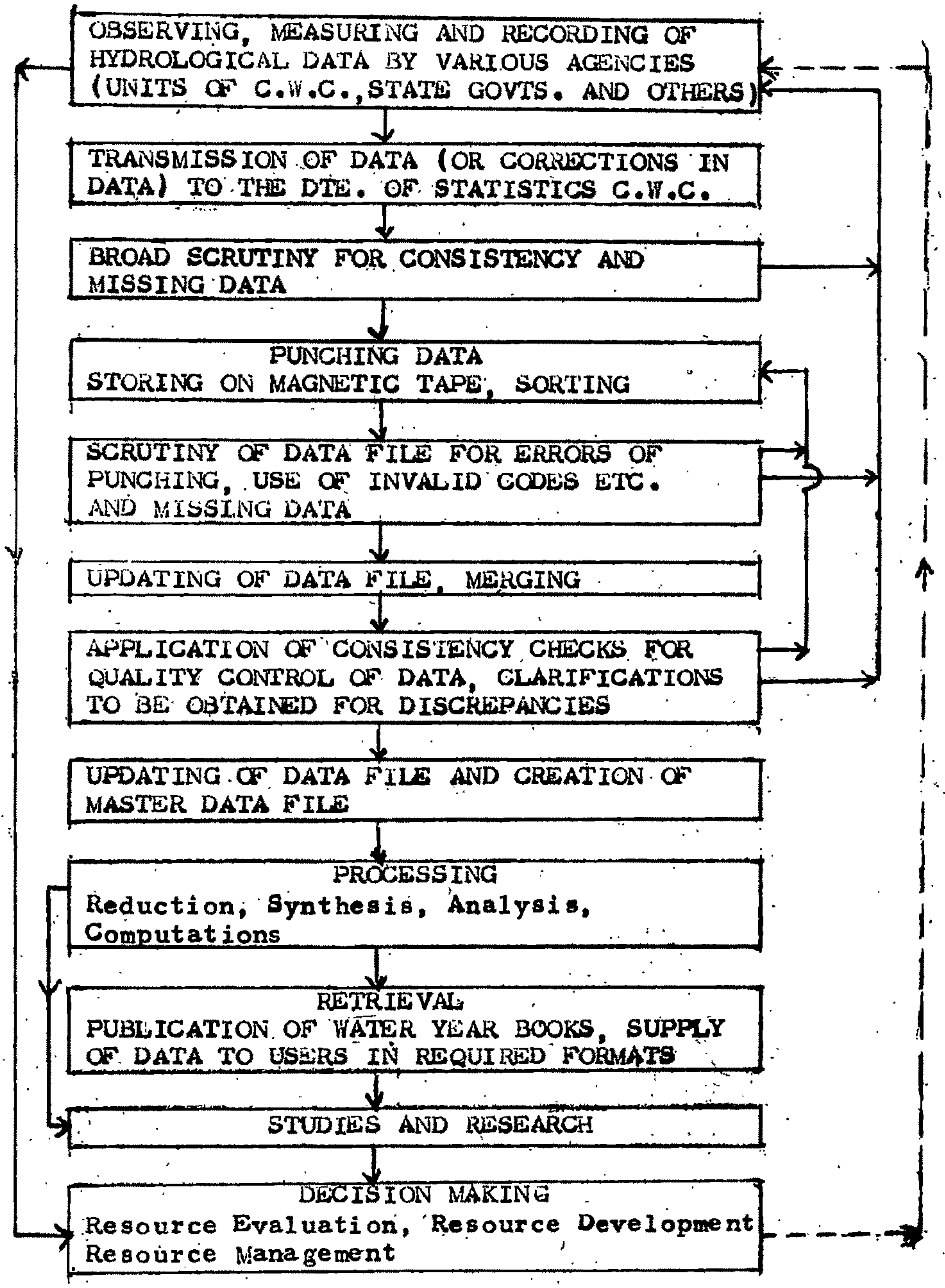
Since the number of observation sites included in this system is about 3,000 and this number will increase in the near future, an inventory of these sites giving the information for each site such as (i) name, code number of s site; (ii) type of the site (S or SD); (iii) river basin, tributary, sub-tributary to which the site belongs; (iv) State and district of location and geographical co-ordinates; (v) data supplying agency; (vi) the period for which data are available at source; (vii) the period for which data are available in the Directorate of Statistics of CWC; and (viii) the date of closure (in case of closed site) has to be maintained and updated from time to time. A computerised inventory system is being developed. A study is being conducted to collect the information regarding methods of taking observations, instruments used, etc., with a view to bring the reliability of the observed data to the International Standards and control the quality of data. This information will also be included in the inventory system being developed. The inventory master file of S and SD sites on magnetic tapes, stored according to the requirements, will be able to tabulate the information of sites basin-wise, state-wise, agency-wise with any combination of further classifications.

15. There are other information systems in CWC which can be computerised. Flood forecasting and flood warning system can be developed as a real time computerised system. This will require, however, advanced techniques such as development of mathematical models to estimate stream flows and water levels at certain points on the basis of rainfall, flows and water levels in the upper reaches and the additional facilities of observing and collecting data by remote sensing along with the present transmission of data by wireless system. Human affliction and property worth crores of rupees can be saved from the floods if precise flood forecasting is done well in advance. This system will also simplify the decision making regarding reservoir regulations which involve the risk of wasting water and power resources against damage to the structure and flooding the area below the reservoir.

16 Maintenance of Secrecy of the Data

Data of some rivers have been classified as secret. No secret data are to be supplied without the prior permission of the appropriate authority. The system has thus to ensure confidentiality. Secret data can be kept on separate tapes which will not be available without appropriate authorisation. Further, a suitable procedure (which would be kept secret) of tape handling would be prepared to ensure additional safety.

Fig. 1 Schematic description of the major elements of the Information System of Storage, Processing and Retrieval of Hydrological Data


OBSERVING, MEASURING AND RECORDING OF HYDROLOGICAL DATA BY VARIOUS AGENCIES (UNITS OF C.W.C., STATE GOVTS. AND OTHERS)
TRANSMISSION OF DATA (OR CORRECTIONS IN DATA) TO THE DTE. OF STATISTICS C.W.C.
BROAD SCRUTINY FOR CONSISTENCY AND MISSING DATA
PUNCHING DATA
STORING ON MAGNETIC TAPE, SORTING
SCRUTINY OF DATA FILE FOR ERRORS OF PUNCHING, USE OF INVALID CODES ETC. AND MISSING DATA
UPDATING OF DATA FILE, MERGING
APPLICATION OF CONSISTENCY CHECKS FOR QUALITY CONTROL OF DATA, CLARIFICATIONS TO BE OBTAINED FOR DISCREPANCIES
UPDATING OF DATA FILE AND CREATION OF MASTER DATA FILE
PROCESSING
Reduction, Synthesis, Analysis, Computations
RETRIEVAL
PUBLICATION OF WATER YEAR BOOKS, SUPPLY OF DATA TO USERS IN REQUIRED FORMATS
STUDIES AND RESEARCH
DECISION MAKING
Resource Evaluation, Resource Development
Resource Management

NOTE : DATA FLOW ⟶ PLANNING & PROGRAMMING - - - >

CLIMATOLOGICAL INFORMATION FOR NATIONAL DEVELOPMENT

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1 *Climatological Information*

Climate is an invaluable natural resource. It has numerous applications to every human activity. Design and operation of any project require climatological information. Industry demands climatological specialisation for siting, lay outs, air-conditioning, heat and light etc., while agricultural and irrigation projects require varied forms of climatological statistics for their working. Civil aviation, multipurpose hydel projects also cannot do without climatolegical data. Competitive maritime commerce calls for information of average weather conditions over the neighbouring seas for safe and optimum routing. Microwave towers, port installations, telecommunications, powerline projects and tall structures require information regarding maximum wind pressure at their sites to allow for safe weather tolerance.

Climatological summaries become extremely valuable and decisive for strategic and tactical planning during emergency and war. 'Further, by reference to climatological statistics, many controversial questions regarding the occurrence of extreme weather elements, claims about climatological changes or trends etc. can be subjected to critical examination.

2 *Climatological Records and Data in India*

Hence, one of the important functions of any meteorological service is the preservation of long period climatological records of weather archives and preparation of climatological statistics. India Meteorological Department has preserved the climatological records not only for periods after 1875 when it came into existence, but also those of earlier periods. The oldest observatory at Madras was established in 1792. It started recording meteorological observations in 1793 and these are the earliest climatological records which have been preserved at Kodaikanal Observatory. Meteorological records since 1841 have been preserved at Colaba (Bombay), the second oldest observatory in India, while records of other very old observatories have also been published and preserved for varying periods. At present the office of the Deputy Director General of Observatories (Climatology & Geophysics), Poona, is the repository of all the climatological data of the department. It is the National Data Centre for weather data in India. It has an IBM 1620 computer, Hollerith tabulator, sorter, reproducer and a number of punchers and verifiers. The CDC 3600 computer at TIFR Bombay also is being made use of for processing climatological data.

The primary responsibility for collecting the surface observational records from the departmental observatories in various States is vested with the Regional Centres at Delhi, Calcutta, Bombay, Madras and Nagpur, and the Meteorological Centres at some of the State Capitals. Observations recorded at each of the observatories are entered in standard meteorological registers. After scrutiny, the data are being transferred to punched cards and sent to Poona where climatological summaries are prepared. The upper air data are sent by the observatories direct to Poona where before punching manual method of horizontal and vertical consistency checks are applied to ensure the space and time consistency of the data. The daily and monthly upper air data are published separately in monthly volume by offset printing computer outputs. The data of autographic instruments of observatories are sent to the concerned RCs/MCs where they are scrutinised and then sent to Poona where mean monthly tables are published.

3 *Varieties of Data*

The following types of data are being collected and archived at Poona:-

31 *Surface*

Consisting mainly of daily synoptic observations (2 to 8 per day) recorded at nearly 500 surface observatories in the country, and hourly observations recorded by autographic instruments at nearly 100 observatories.

Synoptic surface data are being transferred to punch cards for past years. At present the transfer has proceeded backwards upto 1957.

32 *Rainfall*

Daily rainfall data of about 5000 raingauge stations in the country and autographic data of over 100 self-recording raingauge stations. Cards are available for the period 1867 to 1970.

33 *Evaporation*

Data relating to evaporation recorded at over 100 stations in the country.

34 *Marine*

Daily synoptic observations (4 per day) from voluntary observing fleet of Indian Registry now numbering 225 are collected from Ships Logs and transferred to punch cards. They are available in this form from 1946 onwards. In addition, from 1961 onwards punch cards of ships' observation for the Indian Ocean north of 15°S are received on punch cards from various countries whose merchant ships ply over these waters. India functions as a Marine Data Collection & Processing Centre of WMO for this area. The number of cards containing ships' data since 1961 is 1, 156, 000.

35 *Agro-meteorological*

These consist of simultaneous observation on crop growth and meteorological observation of temperature, wind, cloud, rainfall, dew, evaporation, soil moisture etc. recorded at a number of observatories attached to agricultural farms (about 125 stations). Cards are available for the period 1944 up-to-date.

36 *Aeronautical*

Hourly and half hourly observations from all principal airports and current weather observatories. These comprise parameters like pressure, temperature, humidity, wind direction and speed, visibility, cloud and rainfall. Punch cards are available for 10 years 1955-64.

37 *Upper air*

All data of upper air temperature, pressure, humidity, wind direction and velocity at standard levels recorded at 19 radiosonde and 27 radiowind observatories and 74 (including naval and IAF stations) pilot balloon observatories (3 to 4 times daily) are available on punch cards since 1951.

38 *Rocket Meteorology*

Meteorological data of temperatures and winds collected at the Thumba Equatorial Rocket Launching Station (TERLS) near Trivandrum are available on punch cards.

391 *Radiation*

Hourly observation of global solar radiation and diffuse sky radiation at 14 stations are being collected. Effective long wave out going radiation and total solar radiation from sun, sky and earth data are also being collected. These are all available on punch cards.

392 *Atmospheric physics*

Total Ozone, atmospheric electricity, micro-meteorological observations, air quality and pollution characteristics are also recorded at a few stations in the country and their data are being collected.

India Meteorological Department has got raw data on punch cards amounting to 25 millions. The punch cards are preserved in specially designed steel trays with pressure plates so that they may retain their original quality of being useable in card readers and data processing machine. Original records and such derived forms of data contained in them as are appropriate are archived in specially designed cabinets.
2.5 lakhs of punched cards are subjected every month to stringent quality control with machine and manual edit. The new technology of electronic automation provided by IBM 1620 computer at the IITM Poona and the CDC 3600 computer at TIFR Bombay is

pressed into service for checking initial consistency of data and quick preparation of climatological summaries for feed-back to national and international users. Surface and upper air data are summarised into useful statistics.

4 *National Data Centre of Poona*

In order to preserve very old records and publications a microfilm unit forms part of the National Data Centre.

The National Data Centre at Poona meets the requirements of national and international users to the best of its ability. There are plans to acquire a modern third generation computer to meet the urgent need for modern data processing abilities. It is planned to transfer the large number of cards on magnetic tape with the help of computer in order to assure a compact and quick data storage and retrieval system and reduce the demand of space for increasing bulk of punch cards which deteriorate rapidly with time and become unusuable after some years.

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DEVELOPING A NATIONAL INFORMATION SYSTEM IN THE FIELDS OF HEALTH, MEDICINE AND FAMILY PLANNING

Dr. R.K. Sanyal
Director,
National Institute of Family Planning,
New Delhi.

1. *Introduction*

One of the main reasons why man has come to be the dominant species of the spaceship earth is the fact that humans have been endowed with the capacity to communicate with each other with uncanny accuracy, so that concerted efforts may be made to better the life of the community. Natural barriers to communication existing from antiquity like distance, time, language, dialect have more or less been conquered by human ingenuity with its major achievement of evolution of written speech and translation. The documents which carry written speech not only communicate with persons in far flung areas but also serve as our link with the past and the future. The progress in this regard has added a new dimension to the problem and that is of 'volume'. So much information is being generated, so many ideas are being expressed that it is now impossible to absorb even a fraction of the same. The reader has to be selective so that his most precious asset 'time' is not whiled away in useless pursuit of information which is of little relevance. Out of this need of taking the proper information at the proper time to the proper person, has grown the art and science of Documentation as a part of Information System network.

Let us analyse the process of human work, work dedicated to survival, growth as well as prosperity. The process is basically the same whether it is a housewife working on a meal,or an engineer working on a dam. The steps logically are awareness of an imperative need, assessment of the potential available, study of utilisation of resources under similar circumstances by others, planning, execution and assessment of the results with the ultimate objective of learning from experience.

The bigger the task, bigger are the magnitudes of information necessary at all levels. Further needs are specific, but information available on the subject may not be the same. The whole purpose of information system is to provide for specific information promptly when required.

Development or socio-economic progress has a good indicator in the health services. For proper utilisation of human resources, and for proper fulfilment of human desires, a state of good health is vital, health in this context being defined as by WHO "as a state of complete physical, mental and social well-being and not mere absence of disease or infirmity".

Health is intimately associated with nutrition and environment. It is a human virtue to take care of its sick. Family Welfare Planning is linked with health services and at present would appear to be a vital component of developmental strategies.

Our national Government since 1947 have paid attention to comprehensive health development, and instituted a number of national programmes for assuring community health.

All this calls for decisions at all levels with different magnitude of financial implications, and the decision to be correct can only be taken in the background of current situation and current knowledge provided by accurate information system. Thus the need for a documentation centre providing accurate, uptodate and specific information cannot be over emphasized.

In this paper, it is proposed to study the magnitude of the need, both with regard to information and persons needing the same. The present system as it exists is scant and inadequate, but should also be examined so that plans for future development fully utilise the resources already developed and build upon the same to meet the challenges of a dynamic development programme.

2. *THE NEED OF DIFFERENT CATEGORIES OF PERSONNEL*

The information to be supplied by Documentation Centres to be meaningful must be tailored to the individual needs of the clientele. While it is not possible to make pre-planning for all the individual needs, it is possible to categorise the individuals and ascertain the type of services that will be needed by them. The individual needs will be mostly in this range, but for exceptional cases special individual steps may have to be taken.

There are 4 broad groups of personnel in the field of Health, Medicine and Family Planning requiring services as follows:

1. Persons concerned with decision making process.
2. Persons concerned with implementation of the programmes - both official and voluntary agencies.
3. Persons concerned with teaching, training and research.
4. Miscellaneous groups.

The more important a person is in the decision making hierarchy, less is the time he can spare for perusal of documents. The information base may be extensive, but the same will have to be condensed to the essentials in a clear, coherent and comprehensive manner indicating the source for further reading if necessary. The varying needs will also have to be categorised in order of priorities, and this will call for decision making in the centre itself. Thus the personnel required in a documentation centre should not only be those responsible for collection, categorisation and maintenance on the one hand, and those concerned with retrieval, reprography and dissemination on the other, but also with those who can condense information into compact documents, containing all the essentials.

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21 *Persons concerned with Decision-making Processes*

The persons concerned with decision making processes require uptodate information on current situations, trends, in their own domain as well as in allied and related fields. They also require information on past experiences and on similar situations elsewhere in the world. Such personnel can be sub-grouped as:

i. Policy makers and Planners, usually officers of Planning Commission and Ministries.

Information has to be provided to them on current issues (factual, public opinion, etc.) in extremely condensed manner which must be very accurate, along with experience of others facing similar problems and further indicate current trends of thought on the subject.

ii. Such top level personnel are usually supported at a lower level by officers who are concerned with giving information, clarification and attend meetings as officers on attendance. They require more detailed information and actual statistical figures, and lists of studies on a particular issue like bibliographies and location lists and selected reproductions for their own individual study. Actually in the present set up, they prepare the note or memorandum for consideration by the decision makers. Thus a specialized service for the higher level may apparently seem to be redundant, but in actual practice it is not so, as an outside look on momentous issues is always worthwhile.

iii. Political and social leaders, irrespective of affiliations should also have relevant information on issues of interest, so that they may criticise and guide public policies in the right directions. Social organisations concerned with giving voluntary services should have information, so that their limited resources are utilised in the most competent manner. These group of people would require annotated bibliographies, and articles containing information and viewpoints. Thus their needs are in between the above two sub-categories.

22 *Persons concerned in Implementation*

The services of the Documentation/Information Centre are required by two categories:

i. The programme administrators, like top officials of the programme, e.g. Directors, Project Directors, etc. Though these personnel act within the broad guidelines set up by decision and policy makers within the broad programme plan, they have to adjust the machinery according to exigencies of circumstances and also give feedback to the programme.

ii. The other category of personnel are those in direct contact with the field personnel acting in supervisory capacity. They are in a position to spot snags and report for corrective action. For this, they have to be alert and on the look out for snags which have appeared elsewhere in similar situations, how they have been tackled and with what result. Thus their need will be about field problems at micro and edium level, better methods of motivation and service on all aspects of family alth.

Again the need will depend on job specifications, which in the field of Health, Medical Care and Family Planning may be as:

a. Trainers
b. Communicators - Health educators, motivators.
c. Service personnel - Medical Staff, auxiliary staff.
d. Research/Evaluation personnel -
  Biomedical, demographic, sociologists
  anthropologists, media officers.

23 *Persons concerned in Teaching, Training and Research*

i. Senior faculty, concerned with planning, guidance in execution, evaluation and write up of research processes.

ii. Junior faculty concerned with carrying out of research projects.

iii. Students and research assistants.

iv. Teachers.

v. Technical staff.

As a rule, the research workers will be interested in research reports and original work, whereas teachers will be more interested in current thoughts, reviews of literature as well as in newer audio-visual aids and in teaching technology. The researchers will be primarily interested in bibliographies, reprints, annotations and abstracts, Medlars/Medline services, whereas teachers will be interested in proceedings of conferences, symposia, workshops, monographs, manuals, book reviews, etc., though there will be a considerable amount of overlap. This is the total group which uses and will use services of a documentation/information centre most extensively. The interest of the research group will also include translation services.

24 *Miscellaneous Group*

It is difficult to categorise lone persons, who due to one reason or other require information on health, medical care and family planning aspects. It may be a lone physician asking for information on a specific problem, or an entrepreneur thinking of the market before venturing in drug, or nutritional- supplement industry.

3. *EXISTING FACILITIES*

The existing facilities in India are of crucial interest to us but today cooperation between regional countries and international agencies bridge many gaps which otherwise would not be filled for years to come. Awareness of such facilities stimulate their full utilisation. A brief description of facilities available in India will be followed by a description of state-of-art in other countries, and finally about available international aids.

31 *Situation in India*

A documentation information system to be fully active should have clearly identified personnel in need of their services (category wise) in 'Directory' form. The directory will also help members of group to identify each other in their respective fields of specialisation. This is of utmost importance in avoiding unnecessary duplication of efforts. The documentation/information system should have a good library base to draw upon information. They may prepare acquisition lists, bibliographies, annotations of both regularly published as well as fugitive material and send the same to relevant groups. This should be backed by reprint service. Further from time to time reviews of allied papers, books, etc. may be brought out either as separate volumes or as parts of regular issues of journals. Thus a good documentation/information network will have:

i. good library base
ii. documentation service
iii. reprography

Such a situation does not exist anywhere in the South East Asia Region dealing with health, medical care and family planning problems at a national level.

In India, the nearest approximation may be possible, if resources of National Medical Library, Library of All India Institute of Medical Sciences, and activities as well as resources of newly started documentation centre of National Institute of Family Planning (NIFP) are integrated. The NIFP is considering convening a workshop of related agencies to work out the frame work of such a setup.

The facilities and services available at present are:

i. National Institute of Family Planning

The Institute library prepares bibliographies, directories on research and training facilities, annotated lists of recent additions to the library, index of current literature based on periodicals, press clippings,etc. The documentation centre has started functioning in a rudimentary way and has prepared its first set of questionnaires and abstracts to identify its clientele. The centre when fully functioning, will provide abstracts of papers and books, index, bibliography and translation services. It will also attend to specific queries.

The library and documentation centre as parts of Information and Audio-Visual Division which includes editorial and reprography sections. The reprography services will be augmented, and centre fully developed with more acquisitions aided by a grant from United Nations' Fund for Population activities. The Institute is publishing the 'Journal of Population Research', in which abstract on current topics are integral parts. The Government of India is actively considering merging the Institute with National Institute of Health Administration and Education (NIHAE), when the scope of the merged Institute will embrace all aspects of Health and Family Planning problems. At present NIHAE is bringing out a quarterly journal on public health, family planning and population and also giving some bibliography services.

ii. National Medical Library - situated just behind the ICMR buildings and adjacent to the All India Institute of Medical Sciences, the library provides reference and bibliography services to the medical profession in the country. It brings out union catalogue of medical periodicals in Indian libraries.

iii. Library of All India Institute of Medical Sciences (AIIMS)

The library named after the first Director, Dr. B. B. Dixit provides services to students, staff and research workers of all levels. The library has been enriched by donations from collections of Fuetan, Raj Kumari Amrit Kaur and Col. Amir Chand. It contains 23,000 volumes of bound journals, 37,000 books, 8,000 pamphlets, monographs and reports, and subscribes to about 500 periodicals. A considerable number of back volumes of journals have been procured. Services provided include reference on demand, bibliographies and photo-duplication.

iv. Institute for Research in Reproduction, Bombay

It provides reprint services to researchers on biomedical aspects of population and family planning.

v. Central Health Education Bureau, New Delhi

The CHEB Library has brought out a select bibliography on health education and another on audio-visual aids.

vi. Institute of Rural Health and Family Planning, Gandhigram

The library provides reference services to researchers and trainees of the Institute.

vii. International Institute for Population Studies, Bombay

The library publishes a quarterly acquisitions list and compiles bibliographies on fertility and family planning.

viii. Family Planning Association of India, Bombay

The Association publishes a quarterly journal called Journal of Family Welfare (English) and a monthly newsletter - Planned Parenthood.

ix. Office of the Registrar General India, New Delhi

The Library issues acquisition lists (quarterly), serial list and bibliographies, such as bibliography of social studies in India.

In addition to all these, there are Central Training Institutes (total 7 including NIFP), 44 Health and Family Planning Training Centres, 12 Demographic and Communication Action Research Centres located in academic institutions and universities, a number of important and special institutes like Post-graduate Institute of Medical Education and Research (Chandigarh), Jawaharlal Institute of Post-graduate Medical Education and Research (Pondicherry), All India Institute of Physical Medicine and

Rehabilitation (Bombay), All India Institute of Hygiene and Public Health (Calcutta), All India Institute of Speech and Hearing (Mysore), National Tuberculosis Institute (Bangalore), All India Institute of Mental Health (Bangalore), Hospital for Mental Diseases (Delhi), Central Leprosy Teaching and Research Institute (Chingleput), Central Bureau of Health Intelligence (Delhi), V. Patel Chest Institute (Delhi), Haffekin's Institute (Bombay), Tropical School of Medicine (Calcutta), etc; of these the first two are general libraries, whereas others are devoted to their own specialities. In addition there are 105 medical colleges, all with libraries. Thus relatively speaking there is no dearth of material, and a broad base exists for development of a National Documentation - Information network in an integrated manner.

Documentation centres include:

Indian National Scientific Documentation Centre (INSDOC), Regional Documentation Centre in Human Reproduction, Family Planning and Population Dynamics of SEARO office of WHO in New Delhi, Social Science Documentation Centre of Indian Council of Social Science Research (ICSSR, SSDC) all of them in Delhi. Documentation Training and Research Centre (DTRC) in Bangalore is a research and training institute set up by Indian Statistical Institute

The following tools are available:

Indian Science Abstracts (INSDOC), Union Catalogue of Medical Periodicals in Indian Libraries (NML), Regional Union Catalogue of Scientific Serials, Delhi Medical Libraries (INSDOC), Indian National Bibliography (Central Reference Library, Calcutta), Health Statistics of India (Directorate General of Health Services, DGHS), Directories of Medical Colleges (DGHS), Directories of Hospitals in India (DGHS), Directories of Specialised Treatment Centres in India (DGHS), Pharmacopoeia of India (DGHS), Indian Pharmaceutical Guide (Pomposh Publication), Indian Medical Register (Medical Council of India), Union List of Social Sciences Periodicals (ICSSR), Vital Statistics of India (Registrar-General of India).

32 *Situation in Indonesia*

Indonesia has made rapid strides in developing a nation wide programme of data system, in accordance with directives based on Presidential decree No. 8 of 1970 and 33 of 1972. The matter was regarded as one of great urgency to provide for comprehensive programme evaluation and review system. The data system concept embrace assistance to executives, researchers, evaluators, and help in manpower development. As a first step, uniform service statistics data system was organised in 1971 with computer processing and rapid mailing service.

In October, 1973, the initial steps were consolidated and a National Information and Documentation net work on Family Planning/Population was constituted. The Micro thesauraus of Carolina Population Centre was translated to Indonesian. The agency worked in close collaboration with East-West Centre at Honolulu, ESCAP as well as Carolina Population Centre.

In two years the network procured the hardware, some 5000 titles, fugitive material (2000), periodicals (12) and prepared a directory of special libraries. It is producing list of publications, accession lists, bibliographies, journal of research findings, technical reports, area reports, current awareness service, etc. It has worked out reader-profiles and an information dissemination system.

It has also developed a plan of action for 5 years development of the network to include manpower development, induction of new units and subunits in the system, production of union catalogues, assessment of future needs, development of material collection, study of dissemination and utilisation and evaluation of network services.

33 *Situation in Thailand*

Bangkok, which appears to be the focal point of development is also the seat of UN-ESCAP, population division clearing house and information section.

Most of the data system is based on universities of Chulalongkorn and Mahidol as well as National Institute of Development Administration. The Institute of Population and Social Research (Mahidol Unit) has a proposal to strengthen its library and a data bank using a computer.

34 *Other Adjacent Countries*

In Nepal, a country with a population of about 12 million, there are about 10 major libraries.

Bangladesh, which came into being as an independent sovereign country on 16 December, 1971 has a population of about 75 millions and an alarming population growth rate. The medical colleges, and national organisations like Bangladesh Family Planning Board, Bangladesh Family Planning Council, Bangladesh Family Planning Association, Directorate of Training, Research, Evaluation and Communication have their libraries but all in rudimentary stages with no sizeable collections. A central documentation service is visualised which may be based on Bangladesh Institute of Developmental Studies.

The situation in Srilanka is at slightly more advanced stage, the Family Planning Association being a very active one. Library facilities exist in Ministry of Health, Institute of Hygiene, Govt. Ayurvedic Training College, and also in Institute for Training of Nurses. There are two university medical faculty libraries in Colombo and Peradeniya, and a medical library with Srilanka Medical Association. The Regional Office of International Planned Parenthood Federation (IPPF) is located in Srilanka.

Thus, there is a great scope of development of an information network in the whole of South East Asia Region. This is of importance, not only because the problems are similar, but also as diseases, specially of infective nature do not usually halt at the borders.

35 *International Regional Facilities*

There are two very important international regional centres: one in New Delhi located in the Regional Office of South East Asia of the World Health Organization, and the other at ESCAP Population Division, Clearing House and Information Section, at Bangkok.

The library at SEARO of WHO embraces all relevant topics, related to health, medical care and family planning, but its documentation centre is on 'Human reproduction, family planning and population dynamics'. The library collects books, periodicals, indexing and abstracting periodicals, fugitive materials, and has good liaison with ESCAP, Bangkok; Carolina Population Centre, Chapel Hill; Harvard Centre for Population Studies, Massachusetts; Information Population Programme of George Washington University; (all in U.S.A.), East-West Centre, Honolulu; and IPPF, London. Further the library provides Medlars-Medline services through WHO headquarters at Geneva. A number of bibliographic and reference material have been produced. 'An aid to the teaching of human reproduction, family planning and population dynamics' is revised annually. Four annotated bibliographies on (i) Steroid Contraception; (ii) Family Planning Programmes; (iii) Male Reproduction and Fertility Centre; and (iv) Intrauterine Devices have been brought out. Its information dissemination area embraces Bangladesh, India, Indonesia, Nepal, Srilanka and Thailand.

The ESCAP Clearing House is actively engaged in improving channels of communication in the Asian and Pacific Region with regard to population problems. It is estimated that the region covered contains 58 per cent of world population with annual growth rate of 2.5 per cent.

The second Asian Population Conference, held in Tokyo, 1972 recommended specific tasks in field of exchange of population information. The Centre attempts to cater to these and has included research among its activities. The research is not only of diagnostic type in order to recognize need or scope of activities, but also on bibliography control system, and evaluation.

The ESCAP has identified key institutions and personnel and has developed an Asian network of population correspondents. Its translation service, a very important component of its activities was based on a diagnostic research embracing 671 organisations and a study of the same will be a rewarding experience for any one interested in information experiments (See SEA/F.P. Dec. Sem-16-SEARO-WHO, New Delhi).

36 *Other International Facilities*

The 'Index Medicus' is the largest indexing periodical covering 2400 periodicals. The National Library of Medicine (Bethesda, Maryland, USA) started a programme for access to biomedical literature in 1879. In 1962, the library started to develop computerized system for producing 'Index Medicus' which became operational in 2 years time. The system was decentralised by establishing a network of MEDLARS (Medical Literature Analysis and Retrieval System) in USA and some other countries like Australia, Sweden, U.K., and what is most important to us in WHO, Headquarter at Geneva.

The data base of MEDLARS on magnetic tapes include some 200,000 references from 2400 important biomedical journals and can be searched by computer for rapid composition of bibliography on a specified subject.

The Medical Subject Headings (MeSH) is the basic indexing and searching tool with about 8000 headings with 60 sub-headings like diagnosis, occurrence, advance effects etc.

Medlars services are now available on line and called "Medline" services. To utilise this service, it is necessary to have access to a Medline terminal. The WHO - Headquarters Library is linked with computer data base at National Library of Medicine. If one has an access to a teletypewriter attached to the terminal, one can get immediate information.

The WHO service can be availed of by a request to WHO-SEARO library or to headquarters library direct using a form, copies of which are available free of cost to health administrators, medical, health and research institutions, and medical and research workers in the field.

Population Information Programme at George Washington University, called 'PIP' has two components:

i. Publications on Contraceptive technology, summarising recent developments in well documented, well illustrated format. This is essential for any collection on population and is available free.

ii. Retrieval System 'Popinform' on a data base containing literature and statistical data including programme, evaluation and demographic statistics. It may become a part of Medline service under a separate head.

Another computerised information service is located in Technical Information Service (TIS), of Carolina Population Centre at University of North Carolina, Chapel Hill, USA. This service is available on mail request. Data base is the TIS library having 30,000 articles in social, psychological, demographic aspects of family planning, including policies, administration, evaluation, communication, manpower development,etc. Documents are only available to researchers. Requests are to be sent to the reference librarian, who mails the lists. Photocopies of selected papers are provided on request.

The entire catalogue of TIS is available in microfiche and can be used wherever microfiche readers are available.

The other sources of information are International Planned Parenthood Federation; Population Council, New York; East-West Communication Centre, Hawaii; Committee for International Coordination of National Research in Demography (CICNRED, Paris); Karolinska Institute, Stockholm; and Population index of Princeton University, U. S. A.

4. *PLANS FOR THE FUTURE*

How do we visualise an information network?

There are three components involved:

1. Acquisition
2. Analysis, Storage, Retrieval, Reproduction
3. Dissemination

41. *Acquisition*

Any constructive activity is need-based and we have examined the catagories of personnel in need of information and the type of information required. We have also reviewed the existing facilities.

As we have seen that maximum of information is generated abroad and we have access to the same through international agencies. Any library or individual may avail of services free of cost or at a low cost, provided he knows where to apply.

Collection of such materials is costly and much of the money spent in gathering such material may be utilised in gathering information not available through such sources. The difficulty is about getting information about articles published in languages other than English. The ESCAP is looking after S.E. Asia region and provides translation services which may be of interest to us. One hopes the needy will also have access to articles published in languages like Chinese, Japanese in years to come.

The idea of national information network on Health, Medical Care and Family Planning is favoured. This network should have institutional and individual correspondents for gathering information, and should have link with all available international information centres. It may have as its base the relatively well equipped libraries of Delhi and the Documentation Centre at NIFP. The institutions and correspondents may be identified to carry out the following functions:

i. Government correspondents at all levels - to notify about developments in Government policies, personnel changes, legislation, health and family planning intelligence and also answer specific queries.

ii. Academic correspondents should give information about new research projects, data on freshly concluded projects, or progressive data on ongoing schemes, also on available facilities and problematic situations.

iii. Academic bodies and societies - Information about meetings, changes in staff, proceedings of conferences, workshops, seminars along with all papers presented, and also in identifying persons in need of information.

iv. Press correspondents and persons interested in social work to provide news, newspaper clipping, expressed public opinion, and also about important events in related fields likely to have repercussion on Health, Medical Care or Family Planning.

Both academic correspondents and institutions may help with translation services as well.

The cost with this system, when a person or institution takes up correspondence work in addition to routine duties is likely to be minimal.

42. *Analysis, Storage, Retrieval, Reproduction*

A national information network system to be really effective should have comprehensive information which is classified and can be retrieved easily and made available promptly. One can learn from lessons of development of other large information systems. A first step will be development of subject headings. If information is received in precoded forms giving technical details (filling of which should be easy after consulting a manual), storage will be easy. In any large scale operation a computerised storage may be most economical in the long run and assistance for same may be available from international agencies as a part of developmental plans.

Till such time, improved technology takes over, usual library classification and thesaurus use will have to serve.[1]

The information may be sought from computer by computer access terminal in central and state headquarters, important national organisations and ultimately in all districts. It has been predicted that computer costs will fall, and a computer access terminal may cost about 50 U.S. dollars in times to come. (See SEA/FP/Doc. Sem/12-SEARO-WHO). All these may be done in phases.

Till such time, one may ask and obtain specific information either by telephone or by mail.

The reproduction of information either for an individual or for a group calls for microfilm photocopying and mass-reprography services.

43 *Dissemination*

Dissemination should be research based by identification of the individuals and their usual needs. Relevant directories and mailing lists are to be prepared and evaluation studies undertaken from time to time. The dissemination of information should include reference services, annotated bibliographies, conference reports, calender of courses, book review, etc., and specific information to queries.

The importance of correct, comprehensive and timely information cannot be overemphasised in developmental processes. The returns are high on investments in terms of costly mistakes avoided. We have a good base which can be supplemented by linking with other international information systems. With a good organisation and use of modern technology, one can build upon the existing base to provide a worthwhile information service system. At least the time is now ripe when we should seriously look into the possibilities.

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TOWARDS EVOLVING A NATIONAL INFORMATION SYSTEM IN HEALTH AND MEDICAL SCIENCES

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1 *NATURE & SCOPE*

The temptation to assume that everyone knows what is meant by the term "National Information System" especially in a field like "Health and Medical Sciences" is very great. Leaving aside the professional jargon, it may be defined as a mechanism for the collection, processing, analysis and transmission of information for organization and operation of education, research and practice in the field of Health and Medical Sciences. The total effort is directed towards securing effective and prompt delivery of health care to each and every individual in the nation. A comprehensive approach in promoting primary health care within the context of National development efforts was approved by the World Health Assembly and the member states have been urged to fully integrate the Primary Health Care both with the National Health System and with the other sections involved in Community development such as agriculture, education, public works, housing, and communications.

The canvas is thus very wide. Apart from the diagnostic and clinical data, we need to have demographic and environmental information, and data on morbidity, Health care needs, health resources and facilities, medical care utilization and the net result of all the health efforts. While the need for factual information in all these areas may be urgent for strategic planning for improving the Nation's health, we have to bear in mind the caution given by Fox (1973) [1] "though there is plenty of information available for comprehensive health planning, there is lack of a structured system for handling it". We therefore have to be very cautious in designing an information system which should be commensurate with the demonstrated and the anticipated demands of the biomedical community in the country. Our resources are very limited and as we all know, information services come at the lowest rung of priorities in the scheme of national development. So we have to be wise and plan our future system keeping in mind the resources available.

2 *EXISTING FACILITIES*

Any future system will therefore have to be built up on the existing infrastructure in the field of Health, Medicine and Family Planning howsoever inadequate it may be. The three major components of the existing system in the Health, Medicine and Family

Planning are: (i) Libraries attached to Medical Colleges, Research Institutions, Union & State Health Departments, Professional Associations and Societies, a few large Hospitals and some pharmaceutical firms, (ii) Information contained in the published literature - books and periodicals, official as well as non-official reports and documents, audio-visuals (to a very limited extent), manuscripts, and (iii) users or or clienele made up of students and teachers, research workers and practitioners, planners and administrators and large number of para - medical personnel.

3 *MEDICAL LIBRARIES*

There are over 260 Medical Libraries in the country. Most of these Libraries offer skeleton service to their clientele and suffer from all the typical disadvantages such as lack of space, inadequacy of financial support, dearth of trained staff, and the total lack of any training in the use of a library. The pace of development in these libraries is terribly slow with the result that they have not been able to create any visible impact on the delivery of Health Care in the country. The situation has been very well summed up by Dr. E. Brodman (1971) [2] "Often single handed with little support within their Organisation paid pitiful salaries, looked down on by professionals as mere clerks hemmed in by galling restrictions, and without the inspiration and support which a plentiful supply of library literature and attendance at professional meetings of a high level would give them, they still manage to serve, the cause by working hard, devising means to get around restrictions and difficulties and so gradually pursuading the members of their institutions of the worth of Libraries. The difficulty of getting another staff member is as great as (getting) a computer". The only redeeming feature of this otherwise dismal picture is the establishment of the National Medical Library at New Delhi. The National Medical Library is yet to take up its role of leadership in the field of Medical Librarianship, as it has not yet come out of its teething troubles.

(ii) INFORMATION CONTENT:

The information explosion which we are currently experiencing is so vast and tremendous that now both the producers and the users are finding it difficult to handle it. Medicine is indebted to so many other disciplines of which it is an offshoot. But within itself also the approach has become multi-disciplinary among various specialities. Another complicating factor is the level at which information is required - the needs of a general practitioner are different from those of a nurse or an undergraduate Medical student or a teacher or a researcher. During last two decades the output of published literature in the field of Health and Medical Sciences has become just prolific and it is beyond the capacity of the best medical libraries to acquire even a sizable portion of this literature. No doubt Medical Sciences are one of the most organized in so far as bibliographical, indexing and abstracting services - are concerned. But how many libraries in India can afford to acquire all necessary reference tools which are so expensive. We are very much aware of the poor financial position of our Medical Libraries. Another dimension to this problem is added by the vast amount of literature which is not covered by any of the existing bibliographical aids. This is much more true in respect of Indian Literature in Health and Medical Sciences specially the indigenous systems of medicine. Not much attention is paid to cover the Health and Medical information published in non-medical publications. So the wide variety of publication media, inter-disciplinary approach, priority areas to be covered and the level at which the output is to be fed to the users are some of the important considerations which we have to bear in mind in evolving an efficient information system for our country. Yet another important factor is the availability of foreign published literature in procuring which we spend so much time and money and whose applicability to the indigenous problems is controversial. We have just not been able to tide over this problem of speedy access to foreign published literature in India.

Apart from the published literature in the form of books and periodicals, quite an enormous data is compiled and produced at various levels. Some of the efforts to cover this data are notable such as Health Statistics of India, Vital Statistics of India, Census Reports, Survey of Current Interests in India, Annual Reports of Union and State Health and Medical Directorates. But otherwise very valuable data is created and lost in individual hospitals, institutions and departmental files as there is no central clearing house for information of such data - with the result that it is not available to potential users.

(iii) USERS:

The general apathy towards medical libraries in the country is reflected in the attitude of our Health Professionals. The practitioners usually have an attitude of being contented with their preliminary degree or diploma and very few of them keep uptodate by subscribing to one or two professional Journals. Teachers, research workers and post-graduate students who form bulk of the user community are not very persistent in demanding an effective information service to meet their requirements. The para-medical personnel are still worse off in this respect. Most of the Health Sciences Workers prefer to go without any information than pursue their efforts further, probably because they are too apprehensive of the limitations under which the Medical Library system operates in the country (Chitale and Bhatt) [3]. Large number of private practitioners - doctors, hakims, vaidyas and Homeopaths have no access to any medical library worth the name, nor have they any facility of continuing their education further. How can we expect them to deliver the goods effectively if we are unable to rejuvenate them with fresh knowledge, new techniques and methods.

Professional associations and societies also have not been equivocal in demanding efficient medical library service in the country.

It seems to us that the Biomedical Community in the Country have not involved themselves in evolving a need-based efficient information system.

4 *PROPOSED SET-UP*

An ideal information net work in Health and Medical Sciences may be utopia if one considers the enormous amount of fundings, necessary for evolving such a set-up. The quick pace of scientific and technological advancement no doubt has made available the most sophisticated hard and software to herald such a system and in fact efforts are already under way in evolving BCN (Biomedical Communications Network) at the Lister Hill Centre of the National Library of Medicine, U.S.A. But we in this country are yet to achieve certain pre-requistes for the existing infrastructure before attempting any such venture. Our limitations are very obvious and we have got to work with those till we have overcome them. We will now examine these pre-requisites one by one.

(i) MEDICAL LIBRARY SYSTEM:

Needs to be toned up. Financial, administrative and professional support will have to be mustered up to bring them upto a certain desirable level where they can render effective service to their readers. A comprehensive survey of existing medical libraries should be conducted so that a realistic libraries development plan can be drawn up. It should be undertaken by a high level committee which should among other things explore the areas of co-operative acquisition, cataloguing and bibliographical services. The Committee should draw up a master plan for the Medical Library network in the country. It should cover local, state, Regional and National Institutions. It may be re-emphasized that user community must be involved in this survery and planning.

(ii) The recent de-recognition of Indian Medical degrees by the General Medical Council of England has caused much furore, agony and dismay in our Medical fraternity who now realise that it is time to recondition our Medical Teaching to meet our own needs rather than to provide recruits for foreign health services. Medical Library and Information Services can play a vital role in our search for knowledge and technique which is more suitable to our own problems. The Statutory Councils, like Medical Council of India, Nursing Council, Dental Council, Pharmacy Council etc. should prescribe and insist on having a minimum essential provision for Library and information services in the budgets of the Institutions in their respective areas.

(iii) HOSPITAL LIBRARIES: need to be established in every State. In the initial stages matching grant should be provided for each hospital library established by the State. Patient Libraries which are conspicuous by their absence in India, also should be created with support of voluntary Organisation where possible.

(iv) The drug industry in the country could be advised to set aside a certain percentage of their total expenditure on research and publicity for the development of their own Libraries. In fact the National Medical Library, the Drug Industry and appropriate Research Institutes can join hands to initiate a Specialised Information Service on the Drug Literature in the Country.

(v) The doors of all categories of Medical Libraries should be opened to the Private Practitioners also. Professional Associations and Societies can also start subscription Libraries for the benefit of their members.

(vi) There is no facility for training in Medical Librarianship in the country. The National Medical Library should start the proposed Orientation course in Medical Librarianship without further delay. It is also desirable to include an optional paper on Medical Bibliography and terminology in the University Courses in Librarianship for those who wish to take up Medical Librarianship as their career.

(vii) A National Data Bank for Health & Medical Statistics must be created and if possible computerized system be introduced to store and retrieve the data. This could involve with profit those Organizations - Medical and non-medical which are already working on their own.

which the output is to be fed to the users are some of the important considerations which we have to bear in mind in evolving an efficient information system for our country. Yet another important factor is the availability of foreign published literature in procuring which we spend so much time and money and whose applicability to the indigenous problems is controversial. We have just not been able to tide over this problem of speedy access to foreign published literature in India.

Apart from the published literature in the form of books and periodicals, quite an enormous data is compiled and produced at various levels. Some of the efforts to cover this data are notable such as Health Statistics of India, Vital Statistics of India, Census Reports, Survey of Current Interests in India, Annual Reports of Union and State Health and Medical Directorates. But otherwise very valuable data is created and lost in individual hospitals, institutions and departmental files as there is no central clearing house for information of such data - with the result that it is not available to potential users.

(iii) USERS:

The general apathy towards medical libraries in the country is reflected in the attitude of our Health Professionals. The practitioners usually have an attitude of being contented with their preliminary degree or diploma and very few of them keep uptodate by subscribing to one or two professional Journals. Teachers, research workers and post-graduate students who form bulk of the user community are not very persistent in demanding an effective information service to meet their requirements. The para-medical personnel are still worse off in this respect. Most of the Health Sciences Workers prefer to go without any information than pursue their efforts further, probably because they are too apprehensive of the limitations under which the Medical Library system operates in the country (Chitale and Bhatt) [3]. Large number of private practitioners - doctors, hakims, vaidyas and Homeopaths have no access to any medical library worth the name, nor have they any facility of continuing their education further. How can we expect them to deliver the goods effectively if we are unable to rejuvenate them with fresh knowledge, new techniques and methods.

Professional associations and societies also have not been equivocal in demanding efficient medical library service in the country.

It seems to us that the Biomedical Community in the Country have not involved themselves in evolving a need-based efficient information system.

4 *PROPOSED SET-UP*

An ideal information net work in Health and Medical Sciences may be utopia if one considers the enormous amount of fundings, necessary for evolving such a set-up. The quick pace of scientific and technological advancement no doubt has made available the most sophisticated hard and software to herald such a system and in fact efforts are already under way in evolving BCN (Biomedical Communications Network) at the Lister Hill Centre of the National Library of Medicine, U.S.A. But we in this country are yet to achieve certain pre-requistes for the existing infrastructure before attempting any such venture. Our limitations are very obvious and we have got to work with those till we have overcome them. We will now examine these pre-requisites one by one.

(i) MEDICAL LIBRARY SYSTEM:

Needs to be toned up. Financial, administrative and professional support will have to be mustered up to bring them upto a certain desirable level where they can render effective service to their readers. A comprehensive survey of existing medical libraries should be conducted so that a realistic libraries development plan can be drawn up. It should be undertaken by a high level committee which should among other things explore the areas of co-operative acquisition, cataloguing and bibliographical services. The Committee should draw up a master plan for the Medical Library network in the country. It should cover local, state, Regional and National Institutions. It may be re-emphasized that user community must be involved in this survery and planning.

(ii) The recent de-recognition of Indian Medical degrees by the General Medical Council of England has caused much furore, agony and dismay in our Medical fraternity who now realise that it is time to recondition our Medical Teaching to meet our own needs rather than to provide recruits for foreign health services. Medical Library and Information Services can play a vital role in our search for knowledge and technique which is more suitable to our own problems. The Statutory Councils, like Medical Council of India, Nursing Council, Dental Council, Pharmacy Council etc. should prescribe and insist on having a minimum essential provision for Library and information services in the budgets of the Institutions in their respective areas.

(iii) HOSPITAL LIBRARIES: need to be established in every State. In the initial stages matching grant should be provided for each hospital library established by the State. Patient Libraries which are conspicuous by their absence in India, also should be created with support of voluntary Organisation where possible.

(iv) The drug industry in the country could be advised to set aside a certain percentage of their total expenditure on research and publicity for the development of their own Libraries. In fact the National Medical Library, the Drug Industry and appropriate Research Institutes can join hands to initiate a Specialised Information Service on the Drug Literature in the Country.

(v) The doors of all categories of Medical Libraries should be opened to the Private Practitioners also. Professional Associations and Societies can also start subscription Libraries for the benefit of their members.

(vi) There is no facility for training in Medical Librarianship in the country. The National Medical Library should start the proposed Orientation course in Medical Librarianship without further delay. It is also desirable to include an optional paper on Medical Bibliography and terminology in the University Courses in Librarianship for those who wish to take up Medical Librarianship as their career.

(vii) A National Data Bank for Health & Medical Statistics must be created and if possible computerized system be introduced to store and retrieve the data. This could involve with profit those Organizations - Medical and non-medical which are already working on their own.

(viii) A fast Reprography Service is an integral part of any modern information system. While the valuable services rendered by INSDOC and other Institutions are recognized and appreciated by all of us, we need to supplement this service by providing more and more of such facilities at the National Medical Library and Postgraduate Medical Institutes so as to cope with ever increasing demand. The charges for this service should be kept as low as possible, subsidized if necessary, so that a genuine request is not dropped for financial constraints

(ix) Translation services are equally slow and expensive to deter the most aspiring searcher. The ISTA (Indian Scientific Translators Association) and the National Medical Library could jointly evolve a scheme to make the translations available to the users quickly and at reasonable rates.

(x) Users Surveys may be conducted at various levels to identify their actual requirements and improvements in the service could be effected accordingly.

(xi) INDEXING & ABSTRACTING SERVICES:

Apart from the Local documentation lists and current awareness service bulletins at Institutional Levels, there are two noticeable efforts in the country namely Indian Science Abstracts by INSDOC and Index to Indian Medical Periodicals by the National Medical Library. The Health Literature Topics of the WHO, Geneva and Bibliography on Reproduction and Family Planning by the Regional Documentation Centre of SEARO, WHO, New Delhi are other useful services available to the users.

Coverage of Indian Literature in five major indexing and Abstracting Services of the World - namely EM, IM, BA, CA & PA - is very limited.

Thus we need to reorganise our indexing and abstracting services in such a fashion that the Indian Literature is adequately covered and brought to the notice of potential users quite fast. Areas of priorities should be identified and SDI (Selective Dissemination of Information) service should be initiated to feed the workers in their areas with latest information on regular basis. This task can be allocated to the respective institutions such as the NICD for Communicable Diseases, NIN (National Institute of Nutrition) for Malnutrition, NIFP (for Reproduction and Family Planning). But care should be taken to avoid duplication of efforts at all levels. There is no point in duplicating the efforts already being made at National and International Level.

Index to Indian Medical Periodicals could be made a monthly publication instead of half-yearly as at present. Annual cumulation could be issued. The National Medical Library is also planning to issue from 1976 a monthly current Awareness Bulletin to provide information in selected areas.

Time factor is very important in supplying any information to its user. At present there is a great time lag in printing of the Index to Indian Medical Periodicals. Efforts are afoot to reduce that gap and bring out this valuable publication uptodate. There is a great need to computerize the index as it gives wide scope to store the information under various headings and sub-headings which is not possible in ordinary indexing.

(xii) UNION CATALOGUES:

Union Catalogues or Lists of Holdings of Libraries in any Region play a very important part in Library and Information Service. INSDOC & ICSSR have done a commendable job in this field. But the union catalogue of Medical Periodicals in Indian Libraries is lagging behind its last edition having been published in 1963. It is high time that a new edition be issued without further delay. It must be a continuous project and should be kept uptodate by annual supplements. CCRIMH is also seized of the need for bringing out Union Catalogues of Publications in their field.

(xiii) A Directory of institutions and Centres operating in the field of Health and Medical Sciences with emphasis on information and Library services should be compiled and published as soon as possible by the ICMR/NML Collaboration.

All these pre-requisites call for vigorous and simultaneous action on all these fronts. Once this viable infrastructure is built up, further developments to establish a really efficient operative system will follow logically and smoothly. The NCST Plan for Science and Technology Information Service include the Health and Medical Sciences as well and therefore it is reasonable to expect that the Medical Library System would also benefit from it and utilize the additional resources thus made available to improve its services. "Collaborate or collapse" the slogan coined by Advani (1974) [4] very aptly describes the motto around which we must muster our efforts if we desire to achieve our cherished goal of placing right information at right time and place in the hands of our dear readers.

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BRANCH INFORMATION SYSTEM

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1 *NISSAT*

The Science and Technology Plan, which forms part of the larger socio-economic plan (Fifth Five Year Plan) of the country, includes a proposal for the evolution and development of a National Information System for Science and Technology (NISSAT) towards building up a strong information infra-structure for supporting our R&D activities. Interlinking and coordination of the large number of existing information sources, systems and services and thus creating an effective information network under an overall coordinating agency, upgrading the existing centres and augmenting the facilities where necessary and establishing new centres for areas not covered already are the main prongs of activity envisaged under NISSAT. The NISSAT would be a multi-tier organisation consisting of National Information Centres (NCs), Regional Information Centres (RCs), Branch Information Centres (BCs) and Local Information Units (LIUs). The Department of Science and Technology (DST) is now actively engaged in implementing programmes for the development of NISSAT.

2 *Branch Information Centres*

The BCs are the most important subsystem of NISSAT. They are either subject-oriented or mission-oriented information networks. They are mostly devoted to industrial areas. They play a significant role in collection and dissemination of information to every kind of users belonging to a particular discipline or mission. In the total system, these sectoral information centres assume responsibility for offering specsialised information services on a nation wide basis to all the institutions belonging to the branch, to other institutions who may have occasional interest in the particular subject field or mission of the branch and to individual users. They are the nodal points for establishing linkages between the NCs at higher level and the LIUs at lower level.

21 *Functions*

The functions of BCs would be:

1. to provide the following services:

   (a) Specialised indexing and abstracting services for current awareness purpose, including SDI

(b) Retrospective subject bibliographies
(c) Subject union catalogues
(d) Information retrieval and service on request
(e) Information on patents, standards, specifications, etc.
(f). Scientific, technical and economic data service
(g) Computer-based information service in cooperation with NCs and ensuring national and international compatability
(h) Translation and document supply
(i) Literature surveys, state-of-the-art reports, scientific and technological forecasting and other types of techno-economic and special management information;

2. to build up and maintain a document collection, supplementing that of the institutions in the branch;

3. to assume responsibility for coordination of information services within the branch;

4. to offer training facilities for taking care of manpower requirement;

5. to promote creation and development of LIUs by offering advisory service and assistance in information system design, etc; and

6. to develop relations and maintain cooperation with foreign information centres, R&D institutions, professional bodies, etc for ensuring exchange of information.

22 *Users*

The BC and the LIUs of one and the same mission or discipline form a grid of their own, with the BC functioning as the focal point for planning, development and coordination of resources and services. The BCs would cater to the information requirements of users of LIUs in R&D establishments, government departments and agencies, industries-large, medium and small and societies and associations. They would serve the information requirements of scientists and research workers, development and production personnel and planners and administrators.

23 *Organisation*

To begin with, the BCs would be established around the nucleus of the most suitable LIU which has already developed a strong information base. They may also derive institutional support of the parent organisation. However, this arrangement may be transitional and the BCs would have to develop themselves eventually into separate and independent institutions and run on a self-supporing basis. A suitable machinery has to be evolved for maintaining and operating the BCs. They may be independent in their set-up, administratively responsible to the appropriate science agency and technically sharing responsibility under NISSAT. They may be advised and guided by a representative body of institutions and users of the system.

The BCs would be conceived and developed in a manner that they are run on a self-supporting basis in the course of time. The services have to be paid for by the users so that the revenue may take care of the establishment. But it may take some time to reach the take-off stage. Till then, it has to be financially supported through external sources of revenue, by the parent institution and by all the LIUs of the branch on an agreed basis.

3 Systems Approach

31 Information Resources

The BCs would build up a document collection by way of supplementing the resources already available in their LIUs. The BCs would only acquire material not likely to be acquired by their LIUs, such as those falling in the category of costly material, items difficult to locate and procure such as conference proceedings and industrial research reports, foreign language publications, standards, patents etc. A fairly complete collection of indexing and abstracting services and reference material would be maintained by the BCs. They may also collect and maintain a depository of unpublished literature such as theses, research and development reports, trade literature , etc. The entire resources available in the BCs and their LIUs are accessible to all the users in the system. For this purpose, the BCs may bring out union catalogues of material available in the system. Access to resources available in the system would be made possible through provision of reprography facilities, not only in BCs but also in all their LIUs. The aim would be to ensure that every thing worthwhile being published in the subject fields or missions is acquired and made accessible throughout the system.

32 Services

The BCs would select, evaluate and synthesise information in well defined special fields and or in areas pertinent to specific mission and present it throughout the network in a form best suited to the needs of users, either in research, technology or management. The services offered by the system as a whole are expected to play an essential part in the flow of information by maintaining close touch with the status of current scientific and technical research and practice at the BCs and by continuing close association with the users in the LIUs. It may not be necessary that all the services have to be organised only at the BCs. It is possible that some of the LIUs might have already developed expertise and facilities for offering a particular type of service. In such cases they may be continued and if necessary broad based. Some of the mechanised services like SDI, establishment of data bank, and translation service would be centralised in the BCs. Reprography facility may be set up in LIUs also, through on a small scale, while physical production of information publications will be handled by the BCs.

33 Standardisation

All the components of a branch information system are to be considered holistically as a part of a single system. Therefore, there should be compatible standards for information techniques and methods, not only for interchange of information within the branch but also for exchange of information at national and international levels. The promotion of standard practices in information work would be taken care of by the NISSAT and the BCs would have responsibility to enforce their adoption. The standards already evolved by international and national bodies may form a basis for following uniform practice through out the system.

4 *Implementation Programme*

Among the four levels of NISSAT, the BCs were perhaps non-existent before, atleast formally. The absence of this important subsystem was being felt keenly. It was also realised that in developing national information infra-structures, subject specialised information centres constitute a vital link and that they have to be provided for. While some attempts have been made successfully in early seventies, systematic planning for the development of BCs began to receive attention after the advent of NISSAT.

Much earlier than NISSAT was contemplated in 1973, proposals were mooted for the creation of BCs in food by the Central Food Technological Laboratory, Mysore, aeronautics by the National Aeronautical Laboratory, Bangalore, leather by the Central Leather Research Institute, Madras and machine tools by the Central Machine Tools Institute, Bangalore. The plans drawn for the establishment of these BCs have been considered at various forums and accepted. They have been ready for implementation for a long time. When NISSAT came into being, they were naturally thought of as the first ones to be supported under its auspices. The plans of these centres have singly and jointly provided model for the subsequent ones. They offered several guidelines in system design and for drawing up action plan. In many respects, they are the pace-setters for the establishment of BCs in our national system.

The S& T Plan also includes proposals for establishment of an information Centre for housing and construction technology, and National Water Data Bank. The R & D Unit of Bharat Heavy Electricals Ltd, Hyderabad has also plans for setting up an information centre for heavy electrical engineering.

Realising that a number of CSIR laboratories and Cooperative Research Associations offer scope for establishment of BCs devoted to industrial disciplines, Insdoc, in order to enable them to draw up suitable plans, organised a Workshop on the Planning of Branch Information Centres in CSIR, during February 25-27, 1975. The Workshop considered as case study the plans of BCs in food, aeronautics and leather and several other papers relating to planning processes. A number of guidelines for preparing plans for setting up BCs were drawn. The recommendations made at the Workshop served as a catalyst for many CSIR laboratories to come up with proposals for establishment of BCs in their areas of specialisation.

All the proposals which have emanated from CSIR establishments are now with the Department of Science and Technology, after having been supported and duly forwarded by CSIR. In addition, proposals of Machine Tools Information Centre, Housing and Construction Technology Information Centre, and Patent Information Centre are with the Department. The various proposals are now under consideration of the Department for support in the NISSAT scheme. A summary of the proposals so far available for setting up BCs is given in the table at the end. It is expected that financial clearance to the entire NISSAT scheme would be obtained shortly, and that the proposals for establishment of BCs would thereafter receive necessary support from the Department of Science and Technology. It is possible that some token grant may be made available in this year for the information centres in food, aeronautics, leather and machine tool. From next financial year, not only the above four centres may receive necessary support according to plans drawn by them, but the other proposals may be also taken up for implementation. If at least 20 BCs come up during the Fifth Plan, we might have made a good progress to develop the national information infra-structure.

TABLE

SUMMARY OF PROPOSALS FOR SETTING UP BCs

Sr. No.	Name of the BC	Sponsoring Institution	Plan Outlay (in lakhs of rupees)		Services and Facilities	Remarks
1	2	3	4		5	6
1	Food Science and Technology Information Service (FOSTIS)	Central Food Technological Research Institute, Mysore	Recurring		Document Acquisition and Processing (Document procurement, Reprographic copies and translation, Technical processing, Document circulation, Inter-library loan, Maintenance)	Central Facility at CFTRI, Mysore and Regional facilities at CFTRI Experiment Stations in different places Membership fee as a source of revene contemplated
			Documents	16.250		
			Staff salary	19.200		
			Furniture & Equipment	0.250		
			Services (Binding, Computer hire)	1.750		
				37.450		
			Non-Recurring		Documentation Service and Facilities (Reference service, Referral service, Documentation work and service, Data bank, Research, In-service training, Refresher courses)	
			Documents (Block grant)	7.500		
			Equipment (Reprography, Data processing and Office)	2.950		
			Library Building	15.600		
			Furniture	1.500		
				27.550		
			Total	65.000	Promotion of Information Use in Industry (Contact with industry, Industry/product/user profile preparation, Directory preparation, Research in Progress, Sources of Information, Advisory service).	
					Reprography, Printing and Publications	

1	2		4		5	6
2	Information Centre for Aeronautics	National Aeronautical Laboratory, Bangalore	Recurring			
			Documents	35.000	Library Services (Acquisition, Circulation, Readers Service, Inter-library loan etc)	In the outlay, the non-plan grant to be met by CSIR is about Rs. 34.600 lakhs and the remaining Rs. 63.450 lakhs would be additional requirement under NISSAT. The foreign exchange content is Rs. 3.450 lakhs.
			Staff salary	19.300		
			Imported Data Bases	1.950		
			Services	1.500	Information Processing, Storage and Retrieval (Classification and indexing, processing of documents, storage, retrieval)	
			Special Projects	1.000		
				58.750		
			Non-Recurring			
			Equipment (Reprography, Data Processing, Office)	4.000	Information Analysis (Literature search and bibliographies, Trend reports, Reviews, State of the art reports, Data compilation, Central Information Index and Data bank)	
			Building	20.000		
			Furniture	5.000		
			Documents (Block grant)	10.000		
			Audio-visual material	0.300		
				39.300	Information Dissemination (Accession List, CAS, SDI, Abstracting & Indexing service, Digests, News brief, Product information, Translation, Reference/Referral, Document reproduction, Promotion of use)	
			Total	98.050		
					Liaison (Liaison with international and national centres, industry and institutes, User surveys, Preparation of directories, Advisory and Consultancy, Public relations, Training)	

3	National Information Centre for Leather (NICL)	Central Leather Research Institute, Madras	**Recurring**		Information Promotion & Advisory Services Library and Referral Services Documentation Services (Retrospective, Current Awareness, Abstracting, SDI, MIS, Data bank, etc) Editorial, Printing and Reprography Services R&D Consultancy and Training Programmes	In the outlay, the non-plan grant to be met by CSIR is about Rs. 25. 550 lakhs and the remaining Rs. 74. 418 lakhs would be additional requirement under NISSAT. Equipment and machinary will be complemented by UNIDO grant of $ 75, 000 already sanctioned
			Staff salary	61. 244		
			Contingencies	8. 615		
			Maintenance	0. 350		
			Chemicals	1. 100		
				71. 309		
			Non-Recurring			
			Building	10. 000		
			Machinery	6. 175		
			Furniture	2. 189		
			Books	10. 000		
				28. 364		
			Total	99. 673		
4	National Information Centre for Machine Tools	Central Machine Tools Institute, Bangalore	**Recurring**			
			Staff Salary	35. 670	Library Services (Acquisition, Storage, Retrieval, Circulation and Reference) Documentation (Abstracting, Analyses and Syntheses Reporting, Translation, Information Retrieval, Documentation Services) Data Processing (Programming & systems, Input, Processing and Information Retrieval, Output) Data Centre (Census, Market Statistics, Group Technology Survey Data, Materials, Products, Accessories) Public Relation and Publicity Patent Information Service Reprography, Printing and Audio-visual aids Training & Personnel Development	
			Documents	6. 070		
			Data Processing hire charges	2. 000		
			Contingencies	6. 000		
				49. 740		
			Non-Recurring			
			Building	13. 500		
			Documents	59. 000		
			Reprography & Printing equipment	4. 591		
			Data Processing equipment	25. 000		
			Furniture & Equipment	7. 780		
				109. 871		
			Total	159. 611		

1	2	3	4	5	6
5	Information Centre for Housing and Construction Technology		Outlay on Functional Basis Survey of available information services 0.500 Development of Central Information Organisation Acquisition of Literature 12.500 Equipment 13.000 Journal on Housing & Building 3.000 Translation Service 5.000 Abstracting Service 5.000 Publicity 3.000 Seminars, Symposium, Workshop 2.000 Personnel 10.000 Contingency 2.000 Establishment of new regional information cells and strengthening of existing information units in specialised areas such as CBRI, CRI, SERC, etc, about 6 Units - Building Data Centres 44.000 Total 100.000		The proposal has emanated from the Panel on Housing, Urbanisation and Construction Technology of NCST and forms part of the S&T Plan. No indication of the location of the Central Information Organisation is available.

6	Instruments Data Centre	Central Scientific Instruments Organisation, Chandigarh	Recurring Staff Salary Stationery & Postage Non-recurring Equipment Furniture Total	 21.000 1.800 22.800 1.020 0.510 1.530 24.330		
7	Information Centre for Drugs and Pharmaceuticals (ICDP)	Central Drug Research Institute, Lucknow	Recurring Staff Salary Contingencies Documents Non-recurring Machinery Total	 10.716 2.650 3.000 16.366 2.030 18.396	Current Highlights Service SDI Survey of Information Potential Data Bank Strengthening CDRI Library Setting up Reprography Unit Preparation of Status reports Translation Mechanisation of Information Service	The development will be in four phases beginning from 1975-76. In the Sixth Plan, printing Unit and a separate building are envisaged.
8	Branch Information Centre for Metallurgy (BICM)	National Metallurgical Laboratory, Jamshedpur	Recurring Documents Staff Salary Contingencies Non-recurring Building Machinery & Equipment Others Total	 6.000 11.442 1.558 19.000 3.750 6.096 0.904 10.750 29.750	Document Procurement Service Compilation of Bibliographies Answering technical queries SDI CAS Translation Service Abstracting Service Express Information Service Data Bank Reprography Service	
9	National Information Centre for Electrochemistry (NICE)	Central Electrochemical Research Institute, Karaikudi	Recurring Staff Salary Working Expenditure Non-recurring Building Documents Equipment Total	 5.670 0.750 6.420 11.500 4.600 3.250 19.350 25.770	Library & Referral Documentation Service (Retrospective and Anticipatory, Translation, Reprography) Central Information File Editorial Publishing, Printing Reviews Research and Training Programmes	

1	2	3	4		5	6
10.	Information Centre for Essential Oils and Aroma Chemicals	Regional Research Laboratory, Jammu	Staff Salary	2.066	Publishing monographs and forecast trends Commercial Catalogues Acquisition Document Collection & Service Documentation Service on demand and in anticipation Information Bank, Clearing House Industrial Profiles Translation, Reprography Liaison Union Catalogues Promotion of Information Use	Only staff requirements are mentioned in the proposal. Further a sum of Rs. 64,756 is available in non-plan grant of CSIR for the existing posts.
11	Branch Information Centre for Wood Science and Technology	Indian Plywood Industries Research Institute, Bangalore	Recurring Documents Staff Salary Non-recurring Equipment Total	 5.320 5.730 11.050 2.380 13.430	Library Documentation Dissemination Public Relation Reprography, Printing, Audio-visual Industrial Information Service Patent Information Service	
12	National Information Centre for Raw Materials and Industrial Products (NICRIP)	Publications & Information Directorate, New Delhi	Recurring Staff Salary Working expenditure Non-recurring Equipment, etc. Total	 4.440 0.170 4.610 3.066 7.676	Library Reference Statistical & Data Compilation Communication Reprography Training Programme	A part of the expenditure will be met from non-plan grant of PID/CSIR
13	Information Centre for Science Policy Studies	Planning Division, Council of Scientific and Industrial Research, New Delhi	Recurring Staff Salary Contingencies Non-recurring Equipment Total	 3.489 0.750 4.239 1.634 5.873	Document Acquisition Compilation of Bibliographies Preparation of S&T Country Profiles Publication of Current Literature of Science of Science Participation in SPINES programme of UNESCO	

14	National Information Centre for Environmental Engineering (NICEE)	National Environmental Engineering Research Institute, Nagpur	Recurring		CAS, SDI, Bibliography Compilation, Technical Enquiry, Literature Search, Referral, Reprography, Digests, Abstracts, Data Bank, Translation, Editing and Production, Information Dissemination, Package Information, Press clippings, Training, Extension, Directory Compilation
			Documents	2.000	
			Staff Salary	5.500	
			Printing, Production, Distribution	1.500	
				9.000	
			Non-recurring		
			Furniture & Equipment	6.000	
			Building	4.000	
			Total	19.000	
15	Patents Library and Information Centre	Office of the Controller-General of Patents, Designs and Trade Marks, Bombay	Recurring		Acquisition of Documents including patents of important countries, Patent Abstracts, etc. Documentation Service (Classification of Patent literature, Preparation of abstracts and indexes) Dissemination Service through several types of services, products and publications, Translation Service, Reprography Service, Printing facility
			Staff Salary	122.500	
			Contingencies	5.000	
				127.500	
			Non-recurring		
			Land & Building	80.000	
			Equipment	11.000	
			Documents	101.000	
				192.000	
			Total	319.500	

DEVELOPMENT OF COMPUTER-BASED INFORMATION SERVICES IN INDIA

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Traces the historical developmental work in harnessing the computer for information services and products. Describes the present status of computer-based information services. Discusses the existing trends of the development in the advanced countries. Concludes with the presentation of alternatives for developing computer-based services in India. Suggests the necessity of setting-up of a batch mode information networks which could enhance these services and products.

Introduction

A narrrative attempting to trace the developments in any field of human activity tends to become a historic account in which the few pioneers occupy large share. This topic is no exception to this. Looking back from the end of 1976 few organisations and few applications dominate the horizon and the forward sweep indicates vast potential. A comparison with other countries in the world reveals that India has not been lagging much behind the most sophisticated countries – at best this gulf could yawn and cover a period of little over five years. The development of computer based information services commences in 1963-64. The consideration of topological and techno-economic characteristics become imperative to furnish this account with appropriate backdrop for better appreciation.

India - The Action Scene

In India the action scene has its own problems and peculiarities, particularly in the Information Services. Geographically it is a land of varied terrain with activity centres separated by long distances. Demographically India is the second largest country in the world. Its intellectual, R&D and industrial activity is concentrated in over a dozen places. Speaking techno-economically India has all these characteristics which specify a developing country. The country has made significant progress in techno-economic sphere. On the information and library scene the country has a tradition of over a century. There are well stocked libraries dotted all over the sub-continent. No body precisely knows 'how much and where?' These institutions are braving the travesty of information explosion, paper blizzard and budgetary famine. And on the computer or data processing side the country has come to third generation computers in 1970-71 from the punch card era of 1960's. During 1964 couple of second generation general purpose computers were available. Now there are about six third generation and even a 370/155 system available. Inspite of a just pride to be taken in the Space, Atomic Energy, industrial researches and the NISSAT, the statement "India is too weak to matter and too large to ignore" is still valid in almost every sector of human endeavour.

Early Attempts

INSDOC took the leadership in experimenting with the computers for their application in documentation and information work in 1964. The computer that was available to the Experimental Cell then was IBM 1620 model I at IIT Kanpur and the first attempt was to do some work with data collected for union catalogue of scientific serials. The alphabetisation programme was developed and the punched card output was printed on tabulating machine [1]. Within two years in Delhi School of Economics another IBM 1620 model II with Disk drives and on line printer, became available. The first job on this computer system was the processing of the data for the 'Roster of technical translators in India' [2]. This was followed up by experiments on Data Retrieval [3], Processing of data for author and subject indexes to Indian Science Abstracts [4, 5]. An attempt was made to develop the complete and integrated program deck to process Union Catalogue for Mysore State using IBM 1620 at Delhi School of Economics in 1969. The constraints of the computer system presented problems for this data file, though finally the main part with indexes was produced [6]. This was the last work developed for 1620 and to overcome the hurdles of on-line storage limitation, this work was completely redesigned and executed on IBM 360/44 at Delhi University Computer Centre [7]. It will become evident that so far the use of computer by Insdoc has been limited to the development of information products only. With the close of sixties other organisations took interest and appeared in the arena.

DRTC Bangalore

The DRTC in its early stages used an ICL computer at HMT. They implemented the DOC finder system which was later on converted to IBM 1401. Prof. Neelameghan and his group developed a system for implementing the postulational approach [8, 9].

BARC Bombay

The early work at BARC was also on the development of the information product viz. catalogue of technical reports. It is now serving as the input centre to INIS system. They are now developing IR systems for INIS data base.

TIFR Bombay

During early 1970's the TIFR Library developed a program system for generating their library catalogue based on annual acquisitions. [10]

IIT Madras

In the same period the IIT Library developed programs for converting their Union Catalogue into Computer readable form. The IIT Computer Centre developed Policy Information System and Hospital Information System.

COMPUTER-BASED INFORMATION SERVICE IN INDIA

Present Situation

This account, by no means exhaustive, of early developments leads to the present situation where the advances in communication, computer and reprographic technologies are joining hands to give new dimensions to computer based information services. New concepts like on-line interactive systems and information networks have appeared on the world scene. A look at these may provide a clue to the course which India may choose in future.

Data Bases

Data bases used here denote the bibliographic data bases as opposed to factual data bases. The major difference between them is that the former is data dependent and the latter has to be data independent. The bibliographic data bases incorporate the surrogates like author, title, source, keywords, abstracts, etc. of information published in different parts of the world. These are mostly on computer readable form as magnetic tapes. Generally these correspond to the hard copy version of various indexing and abstracting services. Currently there are about fifty data bases covering over six millions items of published information. Some of these data bases are multidisciplinary like Chemical Abstracts Condensate, Compendex, etc. while others are mission-oriented like NSA, INIS, etc. Some of these data bases are centrally generated like CAC, Compendex, etc. while others are generated out of a decentralised input like AGRIS, INIS, LIBRIS, etc. Without being exhaustive the Table 1 gives the idea of variety of data bases now available.

These and other data bases are available on lease basis or on special contract or through a specific communication network. These data bases immediately provide an access to world's literature not only in science and technology but also in social sciences and humanities. With the help of suitable computer and communication hardware the information contained in these data bases can be accessed at a very fast speed. These data bases can be used to furnish a variery of information services and information products.

Computer Technology

The present computer technology offers a 30% cost reduction every year and 10% increase in processing capability. It is possible to use any large computer system from any point on a on-line basis provided appropriate communication technology exist. The days of owning large computers are now receding. The mini- or microcomputer network with a large computer access is gaining grounds. The availability of intelligent or otherwise terminals opens up vast field of interconnected computer networks having different computers serving as nodes. As a matter of fact there are a few such networks existing in the world. The Lockheed, the SDC, and the ESRO network are international in scope. Whereas NRC, LIBRIS, Q/L are networks of national scope.

Information Nets

The progress in the computer technology and its utilisation, the growth in the communication technology opened up a new vista in information technology yielding new products and services. One such dynamic concept is the emergence of information networks. Information network revolves round the concept of centralised computer processing of data bases and decentralised dissemination of information, including the

TABLE 1

Computer-readable Package	Field Covered
ABI-INFORM	Business
FORTUNE	"
TELELIST	Stocks & Bonds
NEW YORK TIMES	News & "Olds"
ENVIRON	Environment
AIR POLLUTION ABSTRACTS	"
IRRD	Road & Highway Research
HRIS	" " "
GEO-REF	Geosciences
WOOD	Paper Pulp & Forestry
API ABSTRACTS	Petroleum
API PATENTS	" Patents
AGRIS	Agriculture
CAIN	"
CRIS	"
TITUS	Textile
TTD	"
SSCI	Social Science
STAR	Aerospace
PANDEX	Science & Technology
SCI	" "
MECH EN	Mechanical Engineering
COMPENDEX	Engineering
PASCAL	Engineering & Physics
INSPEC	" "
SPIN	Physics
INIS	Nuclear Science
NSA	" "
METADEX	Metals
ELDOK	Electro Technology
EMA	Electronics
CIN	Chemical Industry Notes
CA CONDENSATES	Chemistry
CPI	Chemistry Patents
POST-P	Chemistry Patents of Polymers
RINGDOC	Pharmaceutical
EXCERPTA MEDICA	Medicine
MEDLARS	"
ERICTAPES	Education
FSTA	Food

nodal functioning of some information centres which have the nucleus of network which has the computer facilities and data-bases availability. Sometimes such nuclei are interconnected and made available to a number of nodal points with a view to provide access to a larger cross-section of data bases. Needless to say that these network operation is in two ways. One is a dedicated system like Dialog or UOCS ORBIT, or Q/L. The other is time-shared mode like CAN/OLE, REKON, VEERA-III. These information networks have international, national and regional scope. International networks are DIALOG & ORBIT. The national network are CAN/OLE, ISIS, REKON, LIBRIS etc. The regional networks are UOCS, Q/L-systems.

It is possible to have batchmode information networks. CAN/SDI is an example of such a network. In this type of network all the computerised processing is done centrally and normal portal channels are used for delivering customised current awareness service. In CAN/SDI network the input and the output is screened by a mesh of search editors located throughout Canada.

Development Alternatives

India is in a vantage situation for selecting the most appropriate model for computer-based information services at a national level and at the regional levels. Most of these models have been tried and tested. Of course, to some degree these models are machine and hardware dependent. However, the development cost for a de novo system can be avoided by judicious selection of current hardware. Some guiding factors are presented here.

Information Bases

Every country generates its own information and in our country this information is available in about fifteen hundred primary publications - technical reports, patents, standard and theses excluded. For an integrated information system this must be made available in the form of data base for sale, lease or exchange. The requisite computer operations will generate a large number of information products like current specialised or generalised bibliographies which could printed from a single keying operation using computer typesetting and photo-composing. Such a data base could be created as per international standards to facilitate information exchange. The integrated IR systems providing current awareness services and retrospective literature services can also make use of such a data base alongwith the imported data bases. If these data bases are used in conjunction with other data bases being currently developed by Insdoc like On going research projects, Union Catalogue, etc. a wide range of services for planning, controlling and monitoring of R&D activities in India could emanate.

Information Networks

Information network is logical and economic proposition towards which all systems, services and products gravotate. Information network is device to share the available resources by the way of information sources, skilled manpower, software and hardware. The basic concept underlying the information network is the realisation of the fact that information is a commodity or a form of energy which must be made available to anyone who has a potential to use it.

On-time interactive information network is matter of future for India in view of the availabilities of computer power and the state of communication systems. This technological gap does not rule out the possibility for an information network in India. The technology, the communication and the existing facilities do indicate the probability and feasibility of a batch mode information network. In this network the choice is one a hand dedicated, strong, and large computer system for centralised processing and a mesh of information centres and information specialists for decentralised dissemination and input. The other alternative to this is a decentralised processing nodes at centres where computer power is available and strong nucleus of this network to provide standardisation of services and products, skilled manpower, enlightened leadership and effective coordination. All these will have to be achieved and geared for batch mode of the network with a built in switch for converting it to interactive on-line network.

The Environment

Present environment for computer based information services is having many favourable factors. The existence of Unisist at international level and of NISSAT at the national level are two dominating and beneficial situations. One gives a platform for interfacing with international systems. As a matter of fact with the aid of Unesco on behalf of Unisist a pilot project on computer based SDI will be shortly established in India not only for India but also for the region. The NISSAT reflects the magnitude of the governmental interest in the information network for the country. The interaction of Unisist, Unesco and NISSAT will no doubt yield a new philosophy for a novel type of information network which will be based on the realities of technology, socio-economic facts of developing nations. The implementation of this philosophy will mean considerable amount of experimentation in modelling and moduling. It is hoped that necessary funds for this may be esasily forthcoming from NISSAT.

Conclusions

Extensive work with two generations of computers over a period of decade of years has timely established the following:

- One of the advantage of computers is speed e.g. one monthly tape was processed in 188 milliseconds searching 1,000 documents for one term. That is about 5,000 documents in less than one second. Other operations like listing, storing, etc. are performed with similar speeds and efficiency;
- Computers in IR save the librarian's time which may be more effectively used in studying resources, subject area and user need;
- Computerised services open new access to the library holdings and enhance their usage.
- Magnetic tape data bases reach earlier than the hard copy version as these are issued earlier. Certain elements of advance information service yields more user satisfaction;

- Magnetic tape data bases can be processed in a variety of ways e. g. Marc tape can be used for accession cataloguing, then in SDI mode, later in a retrospective search and finally in some of indexes;
- Users profile may be easily updated, revised and run and the cause of hits helps in adjusting a profile;
- The quantity of desired output may be pre-specified in a retrospective searches;
- There is a larger users satisfaction participation and servicing possible;
- Computerised service can be viewed as an improvement of traditional service, it reaches users rather than observing the "side-and-wait" attitude;
- Computerised service saves user's time as well. A narrative and a few keywords is all that he is required to do;
- Computer files save storage space and are compact.

These have given us a faith that computer based information service is the near future for India and the days of on-line interactive systems are not too far off. There must not exist any doubt in this and we must prepare ourselves for this inevitable change for optimising the user satisfaction if not for anything else. In this the leadership is to come from NISSAT.

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MANPOWER DEVELOPMENT FOR INFORMATION WORK

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Introduction

In recent years, there has been an increasing appreciation of the vital role of information in the national development of the country. The thought and attention given by the Department of Science and Technology towards evolving a national information system (NISSAT) and the planning for the setting up of the National Informatics Centre are clear evidences of this appreciation. While this is most welcome and certainly a step in the right direction, the task of designing, organising and operating a national information system is indeed challenging that calls for great ingenuity, imagination and expertise. The different type of specialised skills that are required for the development of a national information system, are not readily available in the country at present except in a rudimentary form. Manpower development, is therefore, an immediate task, on which lies the success of the programmes that are being chalked out presently in the country.

The National Plan for an Information System

The structure envisaged for a national information system comprises of a few coordinating national bodies at the apex, with a number of branch information centres, specialising in a specific field — discipline/mission/product oriented — and other local units devoting entirely to particular institutional activities. Thus the complete national information system will constitute a total network, interacting with each other and providing appropriate services at various focal points. The national information system is expected to meet the diverse requirements of planners, policy-makers and those that are involved at the implementation stages in the government, R&D personnel, business and industry, academacians, scientists, engineers, managers and others working at different positions and organisations. The institutions that will singly and collectively meet the demands are likely to be libraries, documentation/information centres, information analysis centres, data bases and banks, clearing houses, deposit centres, translation centres, etc. These organisations and their services will be backed up and supported by planned developments in computer and telecommunication networks and reprographic facilities.

Quality of Services to be Expected

The deployment of a sizeable financial outlay, manpower and time would naturally have to be geared up to meet adequately the pressures for information. The main pressures will be for the provision of more accessible, faster, more comprehensive and more standardized statistical information systems, coordinated on inter-disciplinary and international bases. The systems will be required to operate Selective Dissemination of Information (SDI) services, carry out retrospective searches, and if required, process the data stored (for example, carry out statistical tests, compute correlations and carry out various other analysis). The need for complex techno-economic-social analyses will require the linking of some of the existing systems in science, technology, and the social sciences, with the statistical systems. Sub-systems will be required for planners at the local and regional levels.

Specialised data banks will increasingly be introduced in a wide variety of institutions and in support of different aims, not only for research and development, but also for production, marketing, and other service functions. Examples of such systems are those that are already serving pharmaceutical research, preventice medicine, crime prevention and detection, ionosphere and weather forecasting, insurance, patent and legal work, etc.

Required Manpower

Keeping in view all the demands that are very briefly sketched above, a wide variety of specialists are to be trained to constitute the manpower force for the national information systems. Taking into account the experience obtained thus far in our country and other countries wherein information systems have been well developed, the types of personnel required may be stated as follows: Information scientists, Librarians, Computer specialists, System analysts and Manager, Technical writers and editors, Translators, Reprographic specialists, Subject specialists with an orientation in information science.

Information Scientists includes senior professional personnel with high academic degrees, who will bear major responsibilities in the information systems.

Librarians with library science degrees responsible for building the libraries and organising services therein.

Computer specialists include personnel for the handling and operation of mechanised and automated processing equipment such as programming personnel, operating staff, computer service specialists and others directly involved in the maintenance of computers and auxiliary equipment.

Systems analysts and Managers are to be associated in situations where advanced data processing systems are maintained including coordinating automated data processing activities.

Technical writers and editors include specialists who could reprocess and repackage information suitable to different types of needs and also prepare technical reports and reviews.

Translators are language specialists skilled in translation work. Subject specialists who contribute to the different types of analysis of information required in an information analysis centres.

The categories of work for which these types of personnel are to employed are: (1) Production and Operation; (2) Design and Development; (3) Applied Research; and (4) Background Research.

The production and operation category will perhaps take the largest of share of the total manpower required for production operation and maintenance of the information systems. Closer to this category, is the design and development personnel who will play a key role in all but the smallest operational units.

Applied research is required both to back-up the development and design effort and to provide the means of bringing the findings of the background research to the stage when these can be used in design. The applied research worker will need to comprehend the background research findings and analyse and synthesise these for the benefit of the design workers.

The background research, while fairly remote from the problems of day to day operation of information units, is required to provide the scientific basis for the development of new methods, and means in information science and technology. It will necessarily be closely linked with work in related fields, such as psychology, linguistics, communication studies and engineering science.

The quantitative requirement of manpower for the national information system will have to be assessed only after a full survey of the existing turnover of candidates available for information work and other related problems.

Education and Training

Education and training for information science are very basic to the proper development of manpower resource planning. What constitute information science has been a subject of debate throughout the world today. Generally speaking the field of activity of the information specialists may perhaps, be described operationally as that represented by, and in, such publications as the Annual review of information science and technology, Journal of documentation, Information storage and retrieval, Journal of the American Society for Information science and abstracting publications such as the Library and Information Science Abstracts, Information Science Abstracts (USA) and Referativnyi Zhurnal: Informatica together with areas in some neighbouring fields such as human communication, psychology, and linguistics. Very large areas of modern librarianship and areas in data processing are included in the field.

In this context, it would be worthwhile to draw attention to a useful publication of Herbert Schur, a member of the Faculty of the Post-graduate school of Librarianship and Information Science University of Sheffield. This work was a study of educational programmes for information specialists, done for the Organisation for Economic Co-operation and Development (OECD). The objectives were the construction of sample curricula for information specialists as well as the identification of gaps in existing curricula. After an elaborate survey, the sample curricula constructed by Schur are identified in terms of the following three facts: category of work (operation, design and development, applied research and background research); level of work (technical assistant, first professional, second professional and advanced professional); and branch of specialization (programme for information specialists to be concerned with substantially natural-language-based systems, programme for information specialists with symbol-, graph or similar-based systems, and "matching section" programmes for specialists in other fields for specialised information system work). Topics to be taught in each of the proposed curricula are grouped into the following six broad areas: generation and use of data bases; data bases and their characteristics; organisation and dissemination of data; information storage and retrieval systems; theoretical and technical tools; and special topics e. g. advanced computer programming and organisation. More specific topics are listed under each of the broad area. For example, under organisation and dissemination of data, the following more specific topics are listed; data acquisition, description, compression; taxonomies, classification of data, indexes and indexing; file structures and organisation for retrieval; data transmission, communication, dissemination. This report provides a useful framework for describing the work performed by different types of information specialists and also a offers a specimen curricula for various types of information specialists.

Existing Manpower Resources in India

Of the different types of personnel required for manning the national information system, one segment viz., supply of librarians, has been fairly well taken care of, thanks to Dr. S. R. Ranganathan who laid the firm foundations for education for librarianship. There are forty universities in India today offering courses in library science at the first professional degree level and ten are offering courses at Master's degree level. Some of these universities have provisions for research, leading to doctor of philosophy. Besides a few state library associations conduct courses at semi-professional levels and a few polytechnics for women train girls in library science at undergraduate levels. The annual turnover approximately works out to 1250 professionals and semiprofessionals.

Training for documentation/information commenced with the establishment of the Documentation Research and Training Centre (DRTC) at Bangalore in 1962 under the auspices of the Indian Statistical Institute, again a contribution of Dr. Ranganathan. In 1964 the Indian National Scientific Documentation Centre (INSDOC) started the training course in documentation and reprography. These two institutions turnout on an average about twenty students every year. These two courses have kept the country's requirements constantly in view in framing the syllabi and compare very favourably with any international course. Research organisations, public undertakings, academic and technological institutions have taken advantage of these courses. Besides the training facilities, DRTC have been engaged in basic and applied research making significant contributions to the field. Most of the university library schools have provided a paper in documentation at their master degree level courses.

Although there are no computer course specifically oriented towards information, the Indian institutes of technology have been offering computer courses which have been utilised by quite a few librarians and documentalists, for information and library work.

Some of the management training institutes in the country have been conducting short term course in systems analysis and management information systems.

For the training of scientific and technical translators Insdoc was conducting a full time course for four years beginning from 1964, for Russian language. This has been suspended temporarily. Some of the foreign language departments of universities provide training in technical translation. The Indian Scientific Translators Association have programmes for instituting full time courses for technical translation in different languages.

There are no courses in reprography for technicians. Insdoc's training course offers a full paper in reprography. A paper in technical writing has also been introduced since 1974 in this course, a formal training in technical writing being offered for the first time in the country. The expertise available at the Publications and Information Directorate of the CSIR and the Indian Standards Institution has been made use of, for this purpose.

Short Term Courses

Short term programmes in information services extending over two to three weeks have been organised by the Small Industries Extension and Training Institute (SIET) for the last two years. The Department of Science and Technology have sponsored a crash programme for grafting scientists and engineers into information work and two eight-week courses have been jointly conducted by DRTC and Insdoc this year. These two courses have been very well received.

Future Requirements

Notwithstanding the efforts taken by the various institutions in the country in building up the manpower resources for information work, this touches only the fringe of the problem. While augmenting support for the existing institutions who supply the manpower now, every attempt should be made to attract the right type of persons into the profession. Unless there are good career opportunities available in the information field, it would be difficult to attract engineers, technologists and scientists into the field. It has been our experience that those working as engineers and scientists at different levels, who are inclined towards making a contribution to the information field, are not prepared to drift to information work, because the opportunities here are not as bright as in the other field. In this context, it may be mentioned that the recent decision of CSIR to put information scientists on a par with research scientists is a very healthy trend and would certainly go a long way to retain and attract the right type of people.

Apart from courses for turning out professionals in the information field, short term courses for computer specialist, systems analysts, subject specialists and others to get a proper perspective of the information field is necessary.

Conclusions

In the foregoing rather cursory account, an attempt has been made to highlight some of the problems relating to manpower development for information in the country. A more systematic qualitative and quantitative study and follow-up action for building up an information cadre are absolutely necessary as we develop an information system for the country.

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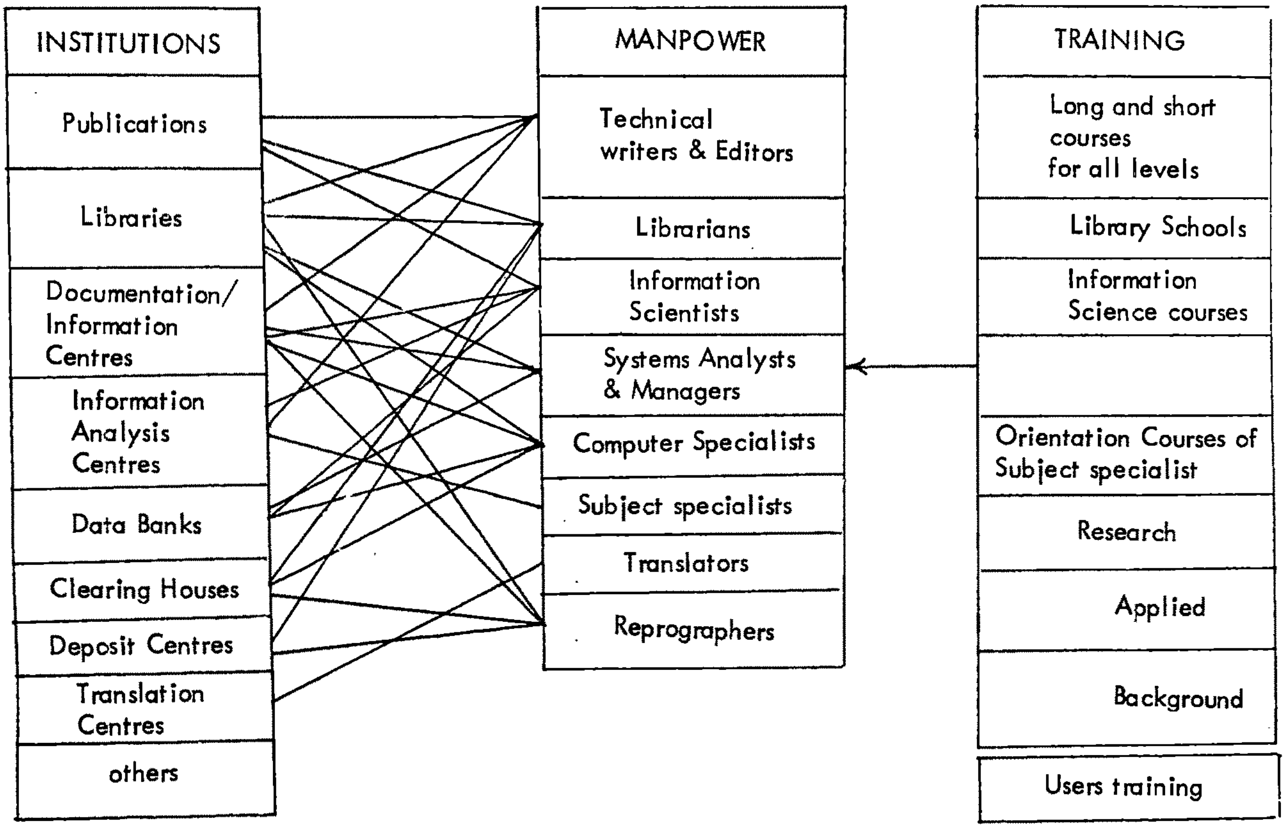
Appendix I

Relation between information institutions, Types of personnel and Training



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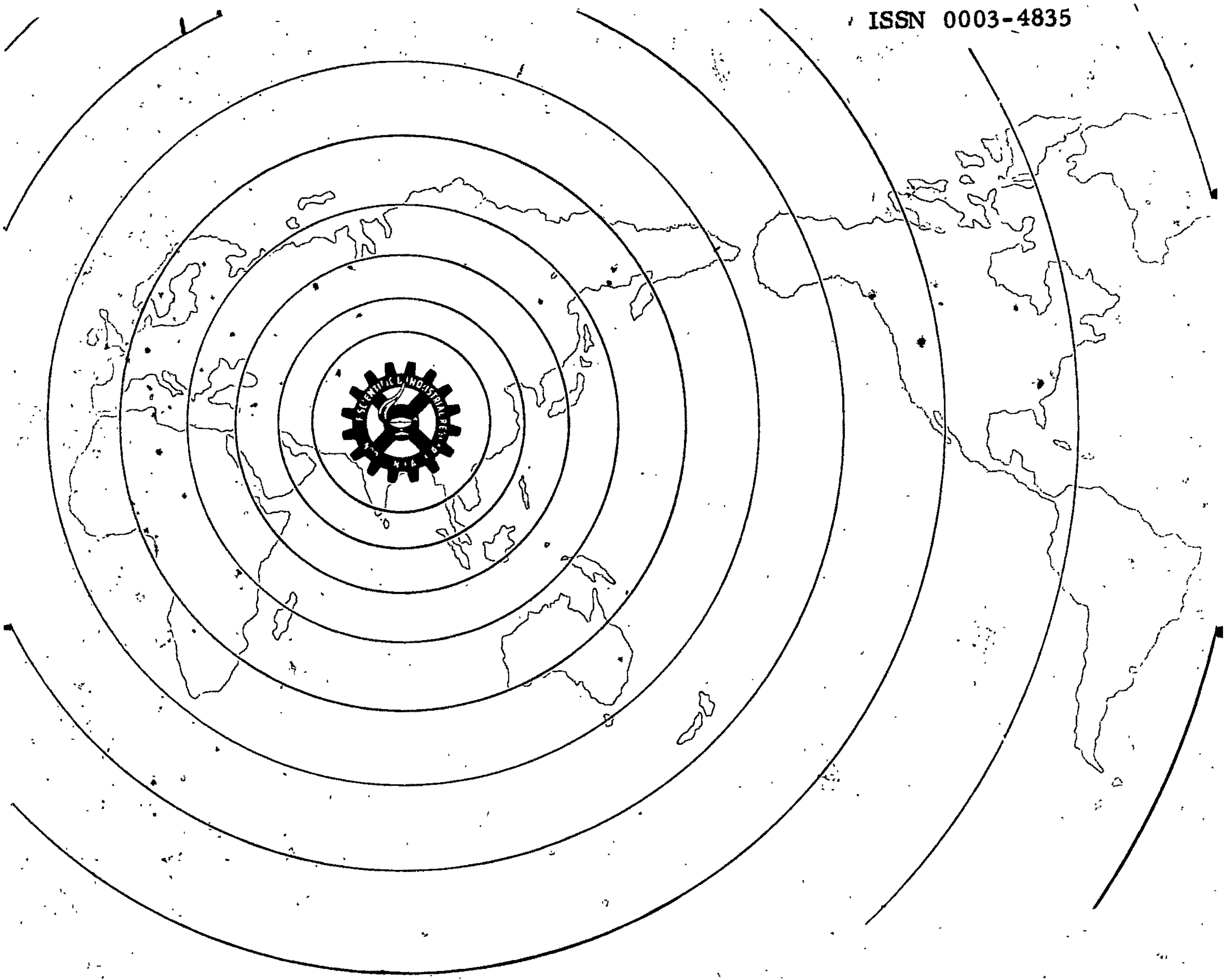

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ON CHANGE OF TITLES OF PERIODICALS. PART 3

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92 Place Names Forming Part of Titles

Titles of periodicals often include words denoting name of a place, a country or its adjectival form, such as, American, Indian, British, etc., and at times words like eastern, international and so on. In some cases, the purpose of including such words in titles appears to be to indicate in some way the scope and geographical affiliation of the respective periodicals. For example, when we get a title like the Indian and Eastern Chemist, the immediate reaction is to consider the journal as one either originating from this region or devoted to the special problems and issues of this region. In some cases, however, the place name gets into the title because the place name forms a part of the sponsoring agency which, in turn, brings it as a matter of course into the title. For example, when the name of a society is the Society for Experimental Biology (London) it is quite natural to have the title of its periodical as the British Journal of Experimental Biology.

There are, however, a large number of periodicals whose titles do not include any place name or similar appellation. In most cases they are considered to be international. If this is so, then the addition of the word international in the title of a periodical appears to be redundant. It unnecessarily loads the title. Realisation of this must have prompted many publishers to drop the word international from some titles.

Three titles coming into this group are given in Table 26.

The first item seems to have changed a lot since its inception in 1920. It had altogether eight changes. The first title was Indian and Eastern Druggist, Pharmacist and Buyers Guide. Since then the changes have been simultaneously on two counts. Firstly, the focus on the geographical area of Indian and Eastern changed to International, and secondly, the focus on the subject area changed from drug, pharmacy, etc. to chemical and process industries and then to chemical and process engineering. In the last change the word international vanished and industries was replaced by engineering. The result is a complete metamorphosis.

Table 26 - Titles Dropping International

Changed to	Changed from [last change with dates]
1. Chemical and Process Engineering	International Chemical Engineering and Process Industries, 1948-52
2. Science and Technology	International Science and Technology, 1962-67
3. Statistical Theory and Method Abstracts	International Journal of Abstracts—Statistical Theory and Methods, 1959/60-63

In the second item the change is just the deletion of the word international. In the third item also the same word, namely, international has been deleted with slight modification in the other words denoting the subject scope.

It appears the word international is getting into the disfavour of journal publishers. Perhaps, this is in realisation of the fact that a journal can be an international one even without announcing this prominently in its title.

93 Omission of Place Names

A large number of periodicals have preferred to drop the place or similar appellation from titles. Evidently this was the easiest way to indicate their wider scope. The reasons for dropping the place names, however, could also be different. The titles coming under this category are listed in Table 27.

Table 27 - Titles Dropping Place Names

Changed to	Changed from [last change with dates]
1. Gardens Bulletin	Agricultural Bulletin of the Straits Settlements and Federated Malay States, 1901/02-12
2. Gas	Western Gas, 1925-36
3. Industrial World	American Exporter - Industrial, 1946-58
4. Journal of Experimental Biology	British Journal of Experimental Biology, 1923-29
5. Journal of Heredity	American Breeders Magazine, 1910-13
6. Journal of Tropical Geography	Malayan Journal of Tropical Geography, 1953-57
7. Medical Research Engineering	American Journal of Medical Electronics, 1961-66
8. Minerals Yearbook	Mineral Resources of the United States, 1882-1931
9. Motor Ship	British Motor Ship, 1927-35
10. Natural History	American Museum Journal, 1900-18
11. Philosophical Magazine	London, Edinburgh and Dubline Philosophical Magazine and Journal of Science, 1841-1944
12. Textile Bulletin	Southern Textile Bulletin, 1921-33
13. Yearbook of Agricultural Cooperation	Yearbook of Agricultural Co-operation in the British Empire, 1926-29

The first item in Table 27 has surely changed to a neat title. The change simultaneously takes care of the subject scope of the periodical and also drops the long place name. The periodical had to change title once earlier also because of change in the name of the place. In the second item the appellation Western actually referred to the Western Coast of U.S.A. This is true for item 12 also.

Change of titles in item numbers 4, 6 and 9 is quite simple and straight forward. It is just dropping of the place or country names from titles. The third title, apart from the deletion of the word American, has changed considerably. The new title is simple and elegant. The original clumsy title is explained by the fact that it started as a supplement to another periodical, namely, American Exporter, hence an attempt was made for some time to maintain a link, through the title, with the parent periodical.

In the fifth item, apart from dropping the word American, another important change has been introduced. The periodical is the organ of the American Genetic Association. Hence to describe the scope of the periodical it had the choice of words like Genetics, Heredity, etc. However, the obvious title Journal of Genetics was taken by another periodical, with which the name of Mrs Haldane is associated and is now being published from Hyderabad (India). Hence the periodical under consideration, perhaps, had to choose the other term. It may be mentioned that both the periodicals were started in 1910.

The seventh item, that is, Medical Research Engineering, had seen some more changes of titles although it started recently in 1961. Surprisingly, it has changed always in the middle of a volume. The first change came with the second issue of the first volume. Apart from dropping the word American, the last change also indicates a broadening of the scope of the periodical.

The change of title in the tenth item, that is, the Natural History is an interesting one. The periodical is sponsored by the American Museum of Natural History. To begin with, the sponsoring agency thought it wise to lend the first half of its own name as the title of the periodical. This gave the title American Museum Journal. After full eighteen years it thought the other half of its name was the better half. Hence, they changed the title to Natural History. In the bargain, the word Journal was also dropped.

The eleventh item in the Table refers to one of the most celebrated scientific journals. It is now even difficult to imagine that such a well known title had continued for more than hundred years with a long and clumsy name as it had. Perhaps it would not be wrong to say that the periodical was already being referred to in the scientific community as the 'Philosophical Magazine' even before the actual change came. This suggests that for periodicals which are very prominent in any field and have to be cited or referred to quite often, a long title is very inconvenient. The users, sooner or later, creates abbreviated titles for them and quite logically the periodicals are obliged to change title.

The next title, the Textile Bulletin, has changed slightly by dropping the word Southern which suggested some geographical or regional bias. The last item in the list, Yearbook of Agricultural Cooperation, had the geographical appellation 'British Empire' attached to the title for four years only. It is to be noted that the change of title came much before the dissolution of the mighty British Empire.

94 Addition of Place or Country Names

Side by side with the tendency for deletion of place names we found almost equal number of periodicals, in fact one more, adding place names to their titles. Generally speaking, it may be conjectured, place names are included in titles mainly to individualise a periodical. The following are the examples:

Table 28 - Titles Adding Place Names

Changed to	Changed from [last change with dates]
1. American Midland Naturalist	Midland Naturalist, 1909-1909
2. Australian Refrigeration	Refrigeration Journal, 1947/48-62/63
3. British Journal of Clinical Practice	Medicine Illustrated, 1949-56
4. British Journal of Photography	Photographic Journal, 1859-59
5. British Journal of Psychiatry	Journal of Mental Science, 1958-62
6. British Knitting Industry	Hosiery Times, 1929-70
7. British Veterinary Journal	Veterinary Journal, 1900-48
8. Canadian Bee Journal	Beekeeper, 1921-33
9. Edinburgh Mathematical Notes	Mathematical Notes, 1909-38
10. Indian Forest Bulletin	Forest Bulletin, 1911-40
11. Indian Forest Leaflet	Forest Leaflet, 1908-41
12. Indian Journal of Nutrition and Dietetics	Journal of Nutrition and Dietetics, 1964-69
13. Indian Medical Record	Medical Record, 1890
14. Quarterly Bulletin of Coal Statistics for Europe	Monthly Bulletin of Coal Statistics, 1947-51

As has been said earlier, the titles have changed exactly in the opposite way compared to the titles considered in the previous section. Thus, if a journal like the British Motor Ship could think of changing over to Motor Ship and still be completely identified, at the same time another journal, the Veterinary Journal thought it wiser to add the place name and change over to British Veterinary Journal.

It may be observed that in the titles in the above table, except item no. 14, the adjectival form of the country name has been used in each case. Five of them are accounted for by British, and four by Indian. It would also be observed that in many cases the occasion to change title by the addition of place name was utilised to introduce certain other, changes and adjustments also. Thus, Mental Science is changed to more precise and accepted expression—Psychiatry and Hosiery to Knitting (items 5 and 6).

The need for addition of place name in the title is mainly due to the need for individualisation. The need for individualisation arises generally because of more number of journals being published in a particular subject and in a particular language. Thus, in the English-language world there is now a general journal in, say, Chemistry, in every country. But the most general title in the subject, namely, journal of chemistry, can be taken up by only one of them. The other journals, in the same subject and in the same language, naturally, have to think of individualised titles. The name of the country of origin is in most cases the first choice. A number of periodicals which appeared first in Britain, in their respective subjects, are still continuing without place name for example, Journal of Hygiene. But subsequent periodicals had to add place names in titles. Considering this fact, it may be advisable to include the place name in the title of a periodical from the very beginning to avoid subsequent changes, when otherwise it becomes too general and more journals are likely to appear with the same title.

95 Alteration of Place Names

The presence of place names in the titles of periodicals may cause changes in titles of periodicals. One obvious reason for such changes would be due to change in the name of a place. The three cases that we have got in this Section are not of this nature. The slight changes made in the titles are obviously for other reasons. The titles are given in Table 29.

Table 29 - Titles Altering Place Names

Changed to	Changed from [last change with dates]
1. Australian Nurses Journal	Australasian Nurses Journal, 1903/04-51
2. California Medicine	California and Western Medicine, 1924-46
3. East African Medical Journal	Kenya and East African Medical Journal, 1928-32

951 Change from Place Name to Country Name

Continuing the cases of alteration of place names in titles, we find that in a number of cases the periodical started as a local venture and consequently had the place name included in its title. Subsequently, the periodical attained a status and to reflect this it was thought expedient to change the place name to the country name. The changes in titles where this tendency is observed are given in Table 30.

Table 30 - Deletion of place name in favour of country name

Changed to	Changed from [last change with dates]
1. Geographical Review of India	Calcutta Geographical Review, 1936-50
2. Indian Cotton Annual	Bombay Cotton Annual, 1919/20-66/67
3. Indian and Eastern Engineer	Indian Engineer, 1886-95
4. Irish Journal of Medical Science	Dublin Journal of Medical Science, 1872-1922
5. New England Journal of Medicine	Boston Medical and Surgical Journal, 1828-1928

In the above list the first three titles happen to be Indian. In the first two the same trend is visible. Place names Calcutta and Bombay have been replaced in favour of the country name India. In the next example (item 3) we find the same trend operating at a higher level. With the country name a regional appellation has also been added. Thus, from Indian it becomes Indian and Eastern. In the last two examples also the tendency of going progressively to higher geographical denomination is visible. The fourth periodical had existed under four different titles since 1832. In the last change Dublin has been replaced by Irish. In the last item in the list a similar change is evident but one remarkable aspect of it is that the change occurred after one hundred years and it has been the only change so far. The new title, in turn, is quite well established by now.

952 Addition of 'International'

In Section 92, we had considered three cases where the word international was dropped from titles. Obviously this word was thought to be redundant. The opposite thinking also appears to be working as is evident from the following three examples:

Table 31 - Titles adding International

Changed to	Changed from [last change with dates]
1. International Abstracts of Biological Sciences	British Abstracts of Medical Sciences, 1954-56
2. International Dyer, Textile Printer, Bleacher and Finisher	Dyer, Textile Printer, Bleacher and Finisher, 1934-63
3. Nuclear Engineering International	Nuclear Engineering, 1956-68

In the first case, the word international replaces British. This was necessary as the earlier title was likely to give a wrong impression about the coverage of the abstracting journal. In the other two cases the word international has been simply added to the previous titles. In the first case there has been another change also by bringing in biological sciences in place of medical sciences. Altogether, it gives the impression of increase in the coverage. Whereas, in the other two cases an improvement in status only is indicated.

953 Dropping of 'International' in favour of country name

There was only one example in the sample where the word international was dropped in favour of a country name. The periodical in question is the American Journal of Medical Sciences. It branched off from the Philadelphia Journal of Medical and Physical Sciences. The same periodical was being published for circulation in Europe as the International Journal of the Medical Sciences during 1886 to 1892. On the whole it appears to have tried with all the three possibilities, that is, using a place name, like Philadelphia, a country name, like American, and also international.

954 Change of Title due to change of Country Name

It is obvious that a periodical having the name of the country in its title runs the risk of a title change with any change in the name of the country. In our sample there are four such cases relating to two countries only. The titles are given in Table 32.

96 Change of Title due to Change of Character

Periodicals or serials comprise a large universe of annals, journals, bulletins, transactions, digests, reports, abstracts, etc. Each one of them indicates a character. Naturally, if a periodical changes its character then the title also has to be changed, if, of course, the previous title was reflecting its earlier character. A number of

Table 32 . Change of Country Name

Changed to	Changed from [last change with dates]
1. Journal of the Malaysian Branch of the Royal Asiatic Society (London)	Journal of the Malayan Branch of the Royal Asiatic Society (London), 1923-?
2. Malaysian Agricultural Journal	Malayan Agricultural Journal 1922-63
3. Monthly Summary of Rainfall, Ghana	Monthly Summary of Rainfall in the Gold Coast, 1952-57
4. Monthly Weather Report, Ghana	Gold Coast Monthly Weather Report, 1949-57

changes have been observed in this category. They are presented below in convenient groups.

961 Deletion of the Character Denoting Terms - Bulletin, Leaflet

A number of periodicals decided to drop the term bulletin from their titles. Some of these titles have already been considered earlier under different categories of change. The titles are given in Table 33.

Table 33: Dropping of the term bulletin

Changed to	Changed from [last change with dates]
1. Applied Spectroscopy	Bulletin of the Society for Applied Spectroscopy, 1947-51
2. Ceylong Geographer	Bulletin of the Ceylon Geographical Society, 1945-57
3. Condor	Bulletin, Cooper Ornithological Club of California, 1899
4. Biometrics	Biometrics Bulletin, 1945-46
5. Clay Minerals	Clay Minerals Bulletin, 1947/52-64
6. Electronic Applications	Electronic Application Bulletin, 1948-55
7. Surveying and Mapping	Bulletin, American Congress on Surveying and Mapping, 1942-44

In all the above cases the periodicals are the official organs of their respective societies or institutions. It is quite natural to have a character denoting term like bulletin in the title of such periodicals. The real need for change must have arisen because of some change in the character of the periodicals at some stage. Bulletin usually refers to a medium for announcement or for giving notice of activities, etc. It does not give the idea of a periodical carrying original contributions as terms like journal or annals, etc. indicate. Hence, if the main objective of a periodical is to publish original contributions then it is better not to use the term bulletin.

It would be observed that the changes in titles listed in Table 33 have a common pattern. All the titles have dropped the term bulletin but none of them has accepted any alternative terms like journal, annals, transactions, etc. in the new titles. Nor, the periodicals have retained anything in the new titles to indicate that they are official organs of any society or institution. It would also be noted that none of the periodicals continued with the term bulletin for very long and most of them had only one change of title.

All the new titles put more emphasis on the subject denoting terms. In fact most of the titles have subject denoting terms only (e.g., items 1, 4, 5, 6 and 7). The second title had to add the geographical term Ceylon, obviously for proper individualisation. The pattern of the third title has been discussed earlier in Section 912. All the new titles are considerably shorter than the old titles.

Similarly, one periodical decided to drop the word Leaflet from its title. The periodical Chemistry is a publication of the prestigious American Chemical Society. It had the following changes.

1. Chemistry Leaflet, 1927-32
2. Science Leaflet, 1932-40
3. Chemistry Leaflet, 1940-?
4. Chemistry [present title]

It can be seen from the above that the subject denoting terms were changed but the character denoting term Leaflet was left intact in the three titles. The last change has brought this also into its fold. The resulting title is not a very elegant one. Such a title cannot be a unique one. It would not be surprising if this new title is changed again to something more expressive and unique.

962 Changed from News, Notes, Newsletter

What has been said in the earlier section applies to this section also. Presence of terms like news, notes, etc. in titles do not give the idea that they may contain articles or similar contributions.

Two titles had to drop these words. They are as follows:

Table 34 - Dropping of News, Notes, Newsletter

Changed to	Changed from [last change with dates]
1. Photogrammetric Engineering	News Notes, American Society of Photogrammetry, 1934-?
2. World Health	WHO Newsletter, 1948-56

Again, like the titles in the previous section, the new titles give more emphasis on the subject denoting terms. The names of sponsoring agencies have been suppressed and no character denoting terms have been used. The new titles are also shorter.

963 Changed to or Changed from Abstracts

First, let us take up the four items given in Table 35.

In the first title, there has been some change in character. An abstracting section was added, as a result of which it was necessary to add the term abstracts. The opportunity was taken to bring in another subject denoting term, that is, oceanographic, indicating enlargement of scope of the periodical. In the second item, the earlier character denoting terms were two -- abstracts and bibliography. In the new title the term bibliography has been dropped. A new subject denoting term has appeared again, that is, geoastrophysical in the new title indicating broadening of scope.

Table 35 - Addition of Abstracts

Changed to	Changed from [last change with dates]
1. Deep-Sea Research and Oceanographic Abstracts	Deep-Sea Research, 1953/54-61
2. Meteorological and Geoastrophysical Abstracts	Meteorological Abstracts and Bibliography, 1950-59
3. SIRA Abstracts and Reviews	Instrument Abstracts, 1959-67
4. Digest of Neurology and Psychiatry	Abstracts and Translations from the Science Library (Hartford, Conn), 1932-44

The third item in the table has multiple changes and one change is in opposite direction compared to the earlier item. From abstracts only it has changed to abstracts and reviews. The subject indicating term instrument has been replaced by the abbreviated form of the Association's name, that is, SIRA (Scientific Instrument Research Association), an indirect method of subject indication.

The fourth item has truly changed its character and hence the corresponding change in title from abstract to digest. The exact scope of the periodical has also been indicated by the addition of the subject denoting terms in the new title, that is, Neurology and Psychiatry.

964 Changed to Journal and Gazette from Bulletin, Circular

In section 961 we have considered seven periodicals which were bulletins but changed their titles without accepting any character denoting terms, although all of them changed to what may be called journal. In the present section we have five items which straightway changed to journal from bulletin. They are listed in Table 36.

Table 36 - Titles changing from Bulletin to Journal

Changed to	Changed from [last change with dates]
1. American Journal of Medical Technology	Bulletin, American Society of Clinical Laboratory Technologists, 1934/35
2. International Journal of Systematic Bacteriology	International Bulletin of Bacteriological Nomenclature and Taxonomy, 1951-56
3. Johns Hopkins Medical Journal	Bulletin of the - Johns Hopkins Hospital (Baltimore), 1921-66
4. Journal of the Electro-chemical Society of India	Bulletin of the India Section of the Electrochemical Society (New York), 1952-63
5. University of Michigan Medical Centre Journal	University of Michigan Medical Bulletin, 1950-63

It was pointed out earlier that the term bulletin is most often associated with the name of an institution or some other corporate agency. This is clearly reflected in all the above five titles. The other common thing between them is that all of them have accepted the character-denoting term journal in place of bulletin. It can be seen that since with the use of the term bulletin the name of the sponsoring agency is usually used, the subject interest of such a periodical is automatically revealed by the name of the agency to a large extent. As a result when a bulletin is changed to journal, there is likely to be greater freedom in the choice of the subject denoting terms. Thus, in the first item, 'clinical laboratory technologists' was replaced by the more precise expression 'medical technology'. Similarly, the rather clumsy expression 'bacteriological nomenclature and taxonomy' in the second item has been replaced by 'systematic bacteriology'.

In the third and fifth item, the change, it can be seen, is marginal. In both the cases, the fact of corporate sponsorship has been maintained in the changed titles. It may be recalled that so far as cataloguing practice is concerned, both the old and new titles will be entered under the names of the corporate bodies.

There is one instance where the title has changed from bulletin to gazette. It is the Botanical Bulletin changing over to Botanical Gazette. The periodical started in 1875 and had the earlier title just for the first volume only. It can be guessed that there was hardly any change in the character of the periodical as a result of this change of title. The publisher must have just thought it to be a better title.

We have one case in our sample where a Circular has changed over to journal. It is the Quarterly Circular, Rubber Research Institute of Ceylon, 1951-58 changing over to Quarterly Journal, Rubber Research Institute of Ceylon. Circular does not give the impression of a periodical intended to carry original contributions or articles. Hence, the term Journal was necessary. It is quite obvious that the title needs a further change, if it has not, already changed, due to the change in the name of the country.

965 Changed to Journal from Proceedings, Digest, Papers and Discussion, etc

For periodicals published as official organs of learned societies and professional associations it was customary to use the term Proceedings, in the titles to denote their character. Proceedings, however, mean something like an official record or account of the deliberations of a meeting or convention. Some of the periodicals originated to carry out this function. But the emphasis gradually shifted to the publication of contributions from members for the benefit of other members. Hence arose the need to find an alternative term to denote the changed character of such periodicals. One obvious choice was the term Journal. The six periodicals which preferred to use the term Journal in place of Proceedings, are:

Table 37 - Changing from Proceedings to Journal

Changed to	Changed from [last change with dates]
1. Journal of the American Society for Horticultural Science	Proceedings of the American Society for Horticultural Science, 1908-68
2. Journal, British Waterworks Association	Proceedings, British Waterworks Association, 1918-43
3. Journal of the Indian Roads Congress	Proceedings of the Indian Roads Congress, 1934-41
4. Journal of the Institute of Fuel (London)	Proceedings of the Institute of Fuel (London)
5. Journal of the Royal Artillery Institution (Woolwich)	Proceedings, Royal Artillery Institution (Woolwich), 1899-1905
6. Journal of the United Service Institution of India	Proceedings, United Service Institution of India, 1873-78

It would be observed that all the items listed in Table 37 are periodicals of societies, associations and institutions. There was no change in their names but they were obliged to change the titles of their periodicals to reflect the true character of the publications. In all the cases there was no other change except the replacement of the term Proceedings by Journal.

Next, we have a case, where the sponsoring agency could not take an outright decision either in favour of Journal or Proceedings. As a consequence it allowed both the terms to get into the title of its periodical. The title is the Journal and Proceedings of the Institute of Sewage Purification (London) which was earlier called Proceedings, Institute of Sewage Purification (London), in 1932. The periodical, started in 1902, had changed its title several times in the past but in all the cases was using the term Proceedings.

We have another case in this group, where the sponsoring body itself had changed its name several times, all reflected in the title of the periodical. The periodical started as the Monthly Digest, Federation of Paint and Varnish Production Clubs, in 1919, and a through a number changes, finally was titled Journal of Paint Technology, in 1966.

Papers and Discussions together is surely a clumsy and inconvenient title for the periodical of corporate body. It is often inconvenient to refer to such a periodical. However, this has been an old habit. Recent periodicals do not use such terms in their titles and there is also a tendency for the existing titles, with such terms to change to something simple and straightforward. One such example in our sample is the Papers and Discussions of the Town Planning Institute (London), started in 1914/15, changing over to Journal of the Town Planning Institute (London), in 1923.

966 Changed from Digest and Record

The periodical International Management has gone through the following interesting title changes since 1946:

1. McGraw-Hill Digest, 1946-54
2. McGraw-Hill International Management Digest, 1955-58
3. International Management Digest, 1958-61

In the above changes certain tendencies are clearly discernible. There is a step by step development from the first title to the present title, that is, the International Management, although there is nothing in common between the first and the present title. In the first title the publisher gave so much prominence to its own name that it excluded, any subject denoting word. This position was sought to be corrected in the second title with the addition of the word, Management. The occasion was utilised to bring in the prestigious word 'International' in the title and hence it became a long title. In the third step, prunning was done by eliminating the name of the publisher which was considered most important in the beginning. It is interesting to note that the publisher was prepared to delete its own name from the title but not the word 'International'. In the fourth title, that is the present title, the character denoting term Digest has finally been dropped. However, it should be noted that the character of the periodical has not changed in spite of these apparent changes.

The title of the other periodical in this group has changed from IRE Wescon Convention Record to Wescon Technical Papers. The significant change, in the present context, is in the replacement of Convention Record by Technical Papers. It may be noted that the term Convention was actually superfluous, because it is covered in the abbreviation Wescon, which stands for Western Electronic Show and Convention. Apart from eliminating this anomoly the only other consideration, in the change of title, appears to be the eagerness of the publisher to give it the impression of a primary scientific journal. Surely, the term 'Papers' does it better than the earlier term 'Record'. Here again, the character of the periodical does not appear to have changed much in spite of apparent change in title.

967 Changing to Abstracts

It should be quite logical for a bibliographical or indexing periodical to change over to an abstracting periodical. However, such changes do not seem to occur very frequently. We had only two such examples. They are:

Changed to	Changed from	[last change with dates]
1. Computer Abstracts	Computer Bibliography, 1959	
2. CSIRO Abstracts	CSIRO Science Index, 1957	

In such a change, there is considerable alteration in the character of a journal. An indexing service becomes an abstracting service with the implications of more laborious and informative in character.

968 Changing to Bulletin

The International Association for Hydraulic Research seems to have of a great fancy for the word Bulletin. The course of changes of the title of its periodical has been as follows:

1. Bulletin, International Association for Hydraulic Structures, 1937-38
2. Hydraulic Research, 1938/47- ?
3. Bulletin Hydraulic Research (present title)

The first title was of the traditional type denoting the publication of a corporate body. The second title was a bold departure from the conventional practice and was a short and elegant one. The third title is actually a retrograde step. The addition of the word Bulletin has not improved the title in any way. Hence it is unnecessary.

9691 Changing from Journal to Research News

The Land Reclamation Irrigation and Power Research Institute (Amritsar) had started publishing a mimeographed periodical under the title 'Journal of the Land Reclamation, Irrigation and Power Research', a very conventional and expressive title, in 1963. After the first four volumes, it changed its title to 'Research News', Land Reclamation, Irrigation and Power Research Institute (Amritsar). The new title cannot be said to be an improvement over the previous title in any way. The change is actually the replacement of the word Journal by Research News. It appears the periodical reports mainly the research activities and findings of the Institute. Hence, the change was thought of.

9692 Change from Journal and Proceedings to Journal

The Institution of Chemists (India) seems not very sure as to how best to title its periodical. The title of the periodical has gone through the following changes:

1. Proceedings of the Institution of Chemists (India), 1929-49.
2. Journal and Proceedings of the Institution of Chemists (India), 1950-66
3. Journal of the Institution of Chemists (India), 1967-

It would be observed that the name of the Institution has always been prominent in all the titles. The doubt has been over the appropriate term that would reflect the character of the periodical. Although the choice fell on the term Proceedings in the first instance, the term Journal was chosen ultimately. In between, for full seventeen years, the title carried most awkwardly both Journal and Proceedings.

9693 Change from Memoirs to Publications

The choice of the character denoting terms never seems to be satisfactory. The South African Institute for Medical Research christened its periodical as Memoirs in 1913 and continued with it till 1921. After that evidently they were looking for a better character denoting term. Perhaps, they were not satisfied with any one of the available terms. As a consequence they must have thought it wise to pick up the most colourless expression Publications and changed the title of the periodical to Publications of the South African Institute for Medical Research.

9694 Change from Newsletter

The term Newsletter suggests a definite character of a periodical. We had in our sample two cases where this term has been changed. They are listed in Table 37.

Table 37 - Dropping Newsletter

Changed to	Changed from [last change with dates]
1. Plastic week	Plastics Newsletter, 1941-58
2. Science News (Washington, DC)	Science Newsletter, 1922-66

In the case of the first item in Table 37, the change in title clearly indicates a change in the character of the periodical also. In the second case, however, replacement of the term Newsletter by News does not indicate any significant change in the character of the periodical. In fact the same periodical had experimented with yet another very similar term earlier, namely, News Bulletin. All the three terms used, denote more or less the same character of a periodical. Hence such changes appear to be meaningless.

9695 Change from Notices

The term Notices has been used prominently in the titles of society periodicals in the earlier days. It is not used very much now. One periodical dropped the term which it was carrying in its title since the last century. The title changed from Notices of the Proceedings at the Meeting of the Members of the Royal Institution of Great Britain, to Proceedings of the Royal Institution of Great Britain.

9696 Change from Papers & Proceedings

Like Papers and Discussions, discussed in Section 965, Papers and Proceedings has been another old and traditional method of designating the publication of a learned society or similar corporate bodies. This also is not to be found in the titles of recent periodicals. The existing titles with such awkward terms are also changing over to simpler titles. This tendency is to be seen in the change over of the title. Papers and Proceedings, United States Naval Institute, started in 1874, to Proceedings, United States Naval Institute. Incidentally, this is the only change the periodical had so far in its hundred years of existence.

9697 Change from Proceedings to Progress

Proceedings is quite an accepted term in the titles of periodicals of corporate bodies. However, the periodical Proceedings of the Annual Meeting, Metal Powder Association (New York), started in 1946, changed its title to Progress in Powder Metallurgy, in 1959. This change in title signifies a real change in the character of the periodical. The term Progress, as is well known, is associated with a type of review publication.

9698 Change from Report to other Terms

The term Report, usually brings into mind a record of the activities and progress of an institution. They are often prepared and presented under legal and administrative obligations. There are reports which are not so dry and rigid official documents. However different they may be the term report is not usually associated with anything which is of the nature of scientific contribution or of research value. Hence, we find that a number of periodicals were obliged to delete the word Report from titles. What they add as replacement is interesting to note. The items falling in this group are listed in Table 38.

Table 38 - Dropping of the term Report

Changed to	Changed from [last change with dates]
1. Annals of the Missouri Botanical Garden	Report, Missouri Botanical Garden (contd.from)
2. Building Research	Report of the Building Research Board, Dept. of Scientific and Industrial Research, Great Britain, 1920-55
3. Fire Research	Report of the Fire Research Board, Dept. of Scientific and Industrial Research, Great Britain, 1947-55.
4. Forest Research in India	Progress Report of Forest Research Work in India, 1919-?
5. Proceedings of the Entomological Society of Ontario	Report of the Dept. of Agriculture, Ontario, ?
6. South African Journal of Science	Report of the South African Association for the Advancement of Science, 1903-08

It would be seen that all the five periodicals are sponsored by some corporate agencies. Hence, the presence of the term Report in the titles of the periodicals was quite relevant. The decision to change the term, naturally, has been taken due to change in the character of the periodicals. There are two different patterns of change in them.

The first item in the list has just replaced the term Report by Annals. A similar pattern is to be observed in the case of items 5 and 6, where two other character denoting terms have come into the titles, namely, Proceedings and Journal. In both the cases, however, there have been other changes also. In the other three cases, namely items 2, 3, and 4, another pattern of change is visible. The new titles have not used any character denoting terms but instead have indicated their character in a different way. In all the three cases the emphasis has been on the subject scope and, perhaps, level and nature of treatment indicated by the term Research. In the 4th item there is some additional information denoted by 'in India'.

It would be observed that in the second pattern of change, all the words used in the new titles were present in the earlier titles also. The new titles have just picked up the most significant terms out of them. The name of the sponsoring agency has been suppressed in all cases. The new titles are shorter in length in all cases.

96991 Change from Report to Technical Report.

There were at least two instances where the sponsors could not be so bold, as in the case mentioned in the previous section. Instead of really changing the title they have merely changed Report into Technical Report. The titles are:

Table 40 - Replacement of Report by Technical Report

Changed to	Changed from [last change with dates]
1. Report (Technical), Central Water and Power Research Station, Poona	Report, Central Water and Power Research Station, Poona, 1937/38-39/40
2. Report (Technical), Hyderabad Engineering Research Laboratories	Report, Hyderabad Engineering Research Laboratories, 1947-48

Both the periodicals are Indian in origin and in both the cases, the earlier titles were allowed to continue for hardly two years or even less.

96992 Other Changes from Report

We had two more cases, in our sample, where the term Report has been changed in some way. The periodicals are listed in Table 41.

Table 41 - Replacement or Change from Report

Changed to	Changed from [last change with dates]
1. Yearbook of the National Institute of Science of India.	Report, National Institute of Sciences of India, 1935-58/59.
2. Report of the Indian Association for the Cultivation of Science	Report and Proceedings of Science Convention, Indian Association for the Cultivation of Science, 1875-1921. Issued in Proceedings of the Indian Association for the Cultivation of Science and Indian Journal of Physics, 1922-34

In the first item, as can be seen, Report has been replaced by Yearbook. This new term hardly indicate any change in the character of the periodical. Rather, it brings into focus the periodicity of the periodical. In the second item, strictly speaking, there is no change in title. Only the report part has been separated from a periodical known bv another title. But it may give the impression that Proceedings has been changed to Report.

96993 Changes from Review

Like Report, the term Review also has a definite connotation. In the context of a periodical, it usually means a survey of the progress of a subject or the literature of a subject during a particular period of time. Let the following two cases be considered where the term review has been replaced in both the titles.

Table 42 - Replacement of Review

Changed to	Changed from [last change with dates]
1. World Surface Coatings Abstracts	Review of Current Literature on the Paint and Allied Industries, 1928-68
2. Annotated Bibliography of Medical Mycology	Review of Medical and Veterinary Mycology, 1943-50

In both the titles, the term Review was being used mainly in the sense of review of current literature. Such review could be in a number of different forms. Abstracting or preparing bibliographies are also, in a sense, reviewing of literature. But, calling such periodicals as reviews does not indicate their exact character. Hence, the publishers of the periodicals have thought it wise to bring in terms like Abstracts and Annotated Bibliography in the titles. The new titles reflect the exact character of the periodicals.

Table 43 - Deletion of Review

Changed to	Changed from [last change with dates]
1. Agriculture and Animal Husbandry in India	Review of Agricultural Operations in India, 1919/20-32/33
2. Soap, Perfumery and Cosmetics	Soap, Perfumery and Cosmetics Trade Review, 1934-35

96994 Other Changes from Review

The term Review can also be used in the sense of focussing the progress of a subject rather than in the restricted sense of surveying its current literature, as in the previous two examples. We have here two examples where the term was being used in its wider connotation. They are given in Table 43. In both the cases, there has been some changes in the character of the periodicals. But both the periodicals have decided not to include any character denoting terms in the new titles. By doing so the new titles imply that they are of the nature of usual periodicals carrying separate contributions.

96995 Inclusions of the term Report

There were two items, in our sample, where the opposite trend can be seen. We have discussed a number of cases, in the preceding paragraphs, where a tendency to change or delete the terms Report and Review was observed. In the present two cases we find Review has been replaced by Report. The title are given in Table 44.

Table 44 - From Review to Report

Changed to	Changed from [last change with dates]
1. Report, Academy of Natural Sciences of Philadelphia	Annual Review, Academy of Natural Sciences of Philadelphia, 1935.
2. Report on NMR Spectroscopy.	Annual Review of NMR Spectroscopy, 1968-69

The first periodical had started in 1919 and experimented since then with titles like Yearbook, Review, and Annual Review and then finally switched over to Report, under which title it continues since 1936. The second periodical started with a perfectly normal title for a publication of its character. It is not known why exactly the title was changed as the new title is in no way an improvement over the old one. It is now learnt that the title has changed to Annual Reports on NMR Spectroscopy. It would not be surprising if the next change brings it back to Annual Review.

96996 Changing over to Yearbook

If we accept Yearbook as a character denoting term, then we have four cases where the titles have taken this term. They are given in Table 45.

Table 45 - Titles Changing to Yearbook

Changed to	Changed from [last change with dates]
1. Yearbook of General Surgery	Practical Medicine Series-General Surgery.
2. Yearbook of Obstetrics and Gynecology	Practical Medicine Series - Obstetrics, Gynecology.
3. Yearbook of Urology	Practical Medicine Series-Urology
4. Yearbook of Pediatrics	Practical Medicine Series-Pediatrics

It would be realised that all the above four titles are from the same publisher and are of complementary nature. They had previously a common title and emphasis was given on the common title. After the change each title acquires an independent status although the new titles are of the same pattern. However, here we are more concerned with the selection of the term Yearbook as a character denoting term.

6997 Change from Transactions

In this last category of change of character we have a solitary example where the periodical has modified the term Transactions in its title. It is not uncommon to find the term Transactions in the titles of learned society periodicals. However, we have seen earlier a few cases where this has been changed. The periodical in question now is entitled Transactions and Studies of the College of Physicians of Philadelphia. The earlier title (during 1875-1937) was simply Transactions of the . . . . . The same periodical had yet another title (during 1841-1874) as Summary of the Transactions of the. . . . Evidently the College wants to project that the periodical is not just what the term Transactions usually connotes. Hence, they have thought it wise to add the term Studies as minimal change. Incidentally, it may be recalled that the world's first scientific periodical, namely, the Philosophical Transactions has not felt the need to alter the term Transactions in any way although the periodical has vastly changed in its character through the long three hundred years of its existence.

TOWARDS EVOLUTION OF A NATIONAL INFORMATION SYSTEM FOR SCIENCE AND TECHNOLOGY IN INDIA

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The plan for the National Information System for Science and Technology (NISSAT) within the framework of the Science and Technology Plan of India has been discussed at different forums and reported in a number of media. The Annals, however, has not published anything on it so far. For the benefit of the readers of Annals we are bringing here a brief report of the NISSAT plan. - Ed.

Role of Information

The government agencies in India are now aware of the importance of scientific information in the social and economic development of the country. It is realised that development of capability in information handling and dissemination would help the country in knowledge advancement, understanding, decision making, transfer of technology, minimising duplication of efforts and conservation of resources. The idea is gaining ground that the social and economic system of the country would function more efficiently if availability of reliable information is ensured. Hence, scientific information is beginning to be regarded as an important national resource, to be developed and made accessible to various kinds of users according to their needs. It is further evident that the quality and quantity of information to be made use of, would be the same as those available to the developed countries and that there is no question of 'second grade information', being in the category of developing countries.

S & T Plan and NISSAT

For the first time, a systematic attempt has been made in India to evolve a Science and Technology Plan as an integral part of the larger socio-economic plan of the country. The basic objective of the S & T Plan is to formulate concrete programmes and identify areas for technological improvement to subserve economic efforts. Applied research activities have, thus, come largely under the purview of the government sector. The R&D is more and more directed towards securing social benefits to the vast majority of the people. It is recognised that science and technology are a tool for national development and that scientific information infrastructures help the process. As a result, the S&T Plan includes a proposal for the development of a National Information System for Science and Technology (NISSAT) during the Fifth Plan period (1974-75 to 1978-79). It is hoped that NISSAT, when fully developed, would enable the country to meet effectively, economically and expeditiously the information demands of scientists, engineers, technologists, management personnel, technicians, the government, the industry and business, etc. at all levels and in all varieties of organisations, projects and missions.

Investment on Information for R&D

Although, the proportion of R&D investment in GNP would be less than one per cent, the country has a larger potential need for information that what is indicative of this investment. Most of the money spent on R&D and proportionally on information for R&D, has to be directly provided by the government. While 5 per cent of the total national R&D outlay is considered to be the essential minimum investment for developing the information infrastructure, the provision would, in effect, be larger if we take into account investments in other sectors such as telecommunication, computer hardware and reprographic equipment whose development would also have a bearing in building the information infrastructure.

Objectives of NISSAT

In a vast country like India, with a developing economy, federal structure of the government and autonomy of the provinces, scientific and technological activities are widely dispersed. A variety of information centres, with differing functions, scope and efficiency, have taken shape in our scientific institutions, government departments, industrial establishments, business firms, etc.

More of such centres are springing up. The action programme of NISSAT envisages interlinking and coordination of these large number of sub-sets of information sources, systems and services into an effective information network under an overall coordinating agency with a national information policy for guidance. Lacunae in information sources, tools and services would be identified and efforts made to fill up gaps. Modern information technology and management methods would be introduced, wherever they would improve the efficiency and effectiveness of information services. Internationally compatible national standards and guidelines for information handling would be developed and applied to facilitate interchange of information. Such a step would help the country to take advantage of international programmes such as UNISIST and UBC and systems such as INIS and AGRIS.

Design Considerations

In the matter of information resources development, while cooperative action will be initiated on the basis of mutually agreed upon acquisition profiles of information centres and systems, it would be ensured that there is in the country a strong national collection of all worthwhile scientific publications. As a prerequisite for the provision of efficient information services, identification of information requirements of present and potential users and creation of information consciousness among them would be taken care of. Special attention would be paid to the need for evaluation of literature, extraction of pertinent information and data, and analysis of information in depth for meeting the high quality of service expected of information systems in the present times. The existing facilities would be strengthened to build up expertise and to provide education and training for an adequate number of qualified information specialists to take care of the present and future manpower requirements of NISSAT. Managerial staff with broader training to plan, direct and administer new information systems would also be necessary. It is hoped that a national science information policy would emerge in due course of time as a component of the national policy for science and technology to ensure necessary inputs and to provide proper guidelines for the development of NISSAT.

STRUCTURE OF NISSAT

National Information Centre

The NISSAT would be a multi-tier organisation. The present and the proposed national information centres would constitute the top level of organisation. They are mission-oriented centres with responsibility for coordinating, organising, and providing information services at national level, covering a wide range of subjects and national endeavours. They would also take care of training and research in information field, provide advisory service and technical assistance and develop relations and cooperation with foreign documentation and information centres. Some national centres of information are already functioning and a few more would be developed. The Indian National Scientific Documentation Centre (INSDOC), the National Science Library of INSDOC, the Library and Information Division of the Bhabha Atomic Research Centre, the Defence Scientific Information and Documentation Centre (DESIDOC), the National Medical Library, the Standards Information Centre and Library of the Indian Standards Institution, the Small Enterprises National Documentation Centre (SENDOC) and the Social Sciences Documentation Centre are already functioning under the auspices of different ministries and agencies. The National Technological Information Centre, the National Science Press, the Electronics Information Centre, the Space Information Centre, the National Agricultural Library and Documentation Centre, the Patent Information Centre, and the National Data (Informatics) Centre are either under development or proposed for development.

Regional Information Centres

At the next level, the establishment of regional information centres would be taken up for utilising fully the literature resources available in the various parts of the country. The regional centres would survey the information resources available in the regions, maintain union catalogues, and mobilise resources for meeting the information demands of the regions with provision of reprographic copies. The regional centres are not subject-oriented. They would cover all branches of science and technology including medicine and agriculture. They would be established in major cities, where science libraries are concentrated and scientific collections are rich. Insdoc has established a regional centre at Bangalore and it is offering information service since 1964. Plans have been drawn up for establishing, during Fifth Plan period, similar regional centres at Hyderabad, Madras, Bombay and Calcutta.

Branch Information Centres

The branch information centres, which are discipline/industry-oriented and providing national service, are in the third level of organisation. They would select, evaluate, analyse and synthesise information in well-defined fields and/or in areas pertinent to specific missions and offer specialised services appropriate to the needs of users. The branch information centres would maintain close touch with current scientific and technical research and practice as well as close association with users. They would create information banks in their areas of specialisation. They would be also responsible for coordination, advisory services, building up document collection, training, and cooperation with foreign information centres and professional institutions, in so far as their discipline/industry is concerned. The branch information centres would be developed from the most suitable local information unit which has already developed a strong information base. They would serve all the institutions and users belonging to the branch system. Plans have already been drawn up and finalised for establishing the Food Science Technology Information Centre (FOSTIS) at the Central Food Technological Research Institute, Mysore, the Information Centre for Aeronautics at the National Aeronautical Laboratory, Bangalore, the National Information Centre for Leather and Allied Industries (NICL) at the Central Leather Research Institute, Madras, the National Information Centre for Environmental Engineering at the National Environmental Engineering Research Institute, Nagpur, and the Machine Tools Information Centre at the Central Machine Tools Institute, Bangalore. Plans are being drawn up for establishing branch information centres in areas such as drugs and pharmaceuticals, metallurgy, building, heavy electrical engineering, instruments, textiles and raw materials. There would also be scope to establish, in the near future, branch information centres in areas such as fertilisers, petrochemicals, heavy engineering, mining, chemical industry, glass and ceramics, mechanical engineering, coal, oceanography, medicinal plants, cement and building materials, etc.

Local Information Unit

The local information units, forming part of individual R&D establishments, government departments, industrial enterprises, business firms, etc. and serving the specific needs of users in their own institutions are the lowest level of organisation. Their number may be estimated to be about 600 at present and more are springing up. They are of varying scope, standard and efficiency. The local information units are the ultimate recipient of information from the national and the branch information centres. They are the constituent units of the branch information system.

Training and Research

The NISSAT would also take care of the manpower requirements towards building the information infrastructures. At present, the Documentation Research and Training Centre (DRTC) at Bangalore and Insdoc at New Delhi are offering specialised training courses in documentation and information science. In library science, training facilities exist in 28 institutions (universities, library associations, and government departments) at the certificate level, in 32 universities at the bachelor's degree level and in 8 universities at the master's degree level. In addition, the Women's Polytechnics offer undergraduate diploma courses. The library science courses have started introducing documentation and information science in their curriculum. Special courses in industrial information are also being organised in a few institutions like SENDOC and DRTC. Under NISSAT, steps are presently being taken to organise short-term courses in various aspects of information work. Training facilities exist in computer applications, translation and reprography and where necessary, they would be strengthened.

The importance of research in information field is also realised. In this connection, the DRTC has done pioneering work, especially in the field of classification. The research efforts in information field are expected to be stepped up under NISSAT.

Suggestion for International Action

While the programme of building a strong national collection of information sources is taken up in India, it may not be necessary to place a complete reliance on this type of endeavour alone. It may be advantageous to seek also access to vast international document collections already available in major information centres in the different parts of the world. For this purpose, it is desirable that international assistance programmes include provision of adequate grants in convertible currencies to enable developing countries like India to draw on the documentary resources of such world centres for meeting specific requirements. A direct assistance like this would be valuable as the need of the developing countries to build comprehensive national collections for themselves would be somewhat obviated.

The idea of regional cooperation for exchange of information and expertise is now gaining ground and it is worthwhile taking it up. For example, India and countries close to it and having similar development could launch cooperative action in matters like current awareness services, group SDI services to be offered from machine-readable data services, training of information personnel, union catalogue of resources, inventory of ongoing research programmes, etc. International and regional organisations may as well promote such cooperative endeavours on a regional basis. Input of information to global information systems could also be on a regional basis.

Bilateral agreements between a developing country and a developed country may cover programmes for making available to the former current publications, R&D reports and serials of the latter, with a view to disseminating their contents and making them available to users. In this connection, the example of the Russian Science Information Centre set up at Insdoc, New Delhi, as part of the agreement concluded by the Indo-Soviet Joint Committee for Scientific Collaboration, is worth mentioning. Under this scheme, India is able to acquire current published literature in the field of science and technology brought out by USSR, and to make them available to scientists, specialists and institutions of higher education and research.

Summary

The NISSAT is a flexible system. Its components operate under a variety of ownerships and jurisdiction. But they would collaborate under the guidance of a coordinating body within the framework of a national science information policy. What is envisaged is some sort of a federation of many scattered and previously existing information centres and libraries and establishing new centres for areas not covered already. Wherever necessary, the existing centres would be upgraded and the facilities augmented. The establishment and maintenance of information centres at various levels would be the responsibility of the agencies or the institutions to which the information centres belong. It is hoped that NISSAT, when fully developed, would build a strong national information infrastructure in order to provide, economically and efficiently, scientists, engineers, management personnel, etc. with rapid access to information. It would also enable the country to take advantage of global information systems.

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REPROGRAPHIC SERVICES IN DELHI LIBRARIES

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Surveys the reprographic facilities available in the libraries of Delhi. The various types of equipment available in these libraries are mentioned. Analyses the implications of the copyright law and development of indigenous reprographic equipment. Suggests better utilisation of the existing facilities and stresses the need for inter-library co-operation.

Introduction

After independence, Delhi has become an important centre of research activities in India. It has the largest number of educational institutions and research establishments. In addition to three universities for post-graduate studies in engineering, the Indian Institute of Technology was established in 1961. There are over fifty colleges affiliated to Delhi University which have facilities for post-graduate studies. According to the 'Directory of Scientific Research Institutions in India, 1969', there were 46 scientific research institutions, in Delhi alone, in 1969. 'Directory of Social Science Research Institutions in India, 1971' lists 27 institutions in Delhi engaged in research in various disciplines in Social Sciences. There are over ten institutions providing research facilities in the humanities. During 1973-74, the Indian Council for Social Science Research granted a sum of Rs. 13,20.739 for Delhi State [3].

With the increase in research activities the number of learned publications, research reports and scholarly journals has accelerated tremendously. The availability and growth of Union catalogues, indexing and abstracting journals, have also necessitated the demand for copies of documents from different sources. It is virtually impossible for any research institution, library or a learned body to collect, collate, classify, catalogue, store and retrieve all the published and unpublished information that is relevant to their field of study today or which may become relevant at a future date. The enormous rate at which documentary material is growing, makes the use of simple, inexpensive and exact copying of such material, a vital means for effective communication.

During the past few years, the cost of printing paper has risen notably. As a result, prices of books and periodicals have become almost prohibitive. This problem is more serious in developing countries where due to economic pressures and paucity of funds, limited numbers of copies of essential items are available to research workers and scientists. For obvious reasons it is cheaper to obtain a photocopy of a periodical article, rather than to buy the original.

Reprographic techniques enable one to obtain from an original document, a copy or copies which resemble it in all respects except perhaps the size which can be varied as required in some techniques. The language of the original or any complicated diagrams, maps, etc. that it may contain does not in any way prevent copying. Reprographic techniques, also by reduction in size such as in microfilming or reduced size copying, can produce easy-to-handle copies from large-size documents, maps, etc. These advantages have found numerous applications in every place where documentary material is being used: in the office as a substitute for many laborious and time-consuming clerical operations such as retyping; in industry for the convenient copying of large-size drawings, plans, charts, etc. and in libraries, archives and research institutions for obtaining copies of out-of-print material and unpublished works, for saving storage space, for publication in limited editions and for use in information retrieval systems.

1. Types of Reprographic Techniques

Most of the reprographic equipment of today is of the push-button type requiring little skill on the part of the operator. Comparatively inexpensive copies can be made in a matter of seconds. The equipment is generally compact and can be placed on the desk top. Some of the equipment produce different kinds of copies usable for purposes such as "masters for spirit duplication, offset printing and diazo printing, transparent copy for use in projectors, colour-coated copy, and copy on various kinds of paper ranging from tissue to card. The chart shows various types of reprographic techniques in use in Delhi Libraries (see Fig. 1).

2. Libraries providing reprographic facilities in Delhi

Delhi has a large number of libraries attached to government, academic and research institutions. Some of them have arrangements for reprographic facilities for a limited number of clientele. Most of the institutions under governmental auspices have been making use of reprographic techniques on a limited scale. Governmental involvement with reprography has been in connection with the following activities:

Scientific documentation, archives, registration of title deeds, financial audit, tourist traffic, census operations and public sector industries.

2(A) Government Libraries

2(A).1 Central Secretariat Library (CSL)

CSL serves as a departmental library for the Ministry of Education and Social Welfare and is one of the largest departmental libraries with more than 400,000 volumes and over 100,000 government publications. It receives about 1,000 periodicals.

Their reprographic equipment consists of a 'Panaprint Photo Copier' developed and manufactured by M/s Advani Oerlikon of Bombay and a microfilm reader. Reprographic services are strictly for official use and are not open to public. Reprographic section especially caters to the needs of its parent body, the Ministry of Education and Social Welfare.

2(A).2 Central Road Research Institute Library (CRRI)

CRRI's library has about 25,300 volumes. The Institute specialises in research on all aspects of road building and traffic flow.

The reprographic section is a part of CRRI's library. Their services are confined only to the users of the Library and research-scholars engaged in road research and related activities. The following equipment are available in the library:

(1) Microfilm camera, manufactured by Kodak, England.
(2) Xerox.

They use indigenously developed diazo paper.

2(A).3 Defence Scientific Information & Documentation Centre (DESIDOC)

DESIDOC has an independent reprographic unit. Their services are available to the Defence Services staff and those engaged in Defence Science research. They also have a separate photographic unit. Since reprographic services are available only for official use, there is no service charge. The following equipment are available at the Centre:

(1) Agfa Gevaert processing camera
(2) Xerox-pylorys KS2
(3) Kodak printer.

2(A).4 Department of Tourism, Government of India

Under the supervision of the Central Government, the Department of Tourism installed around 1959, the diffusion transfer equipment alongwith contact/reflex copiers at important ports for copying the documents containing records of the incoming foreign tourists.

2(A).5 Indian Council for Agricultural Research (ICAR)

Among the institutions working under the ICAR the Indian Agricultural Research Institute (IARI) library in New Delhi has perhaps the best reprographic unit. The equipment available at the IARI library consists of the following:

(1) Microfilming camera
(2) Document printer
(3) Microfilm reader-cum-printer
(4) Enlarger for processing photocopies from microfilming negatives
(5) Photostat machine
(6) Xerox
(7) Camera for making projective slides.

The IARI provides the following reprographic services: Microfilm strips, photo copies, diazo copies and slides to over fifteen hundred scientists, students and research workers.

2(A).6 Indian National Scientific Documentation Centre (INSDOC)

It was not until 1952 that an organised and well-equipped reprographic service accessible to a wide range of users came to be established. UNESCO played an important role in the establishment of INSDOC. It was with their help that an extensive programme of microfilming and photo copying was started.

Besides furnishing copies of scientific documents demanded by the users, INSDOC also undertakes to produce various kinds of reprographic versions of documents brought in by the clients.

The photography section of INSDOC has a full range of microfilming and photocopying equipment. Documents obtained from local and outside libraries for document procurement services are copied in this section. The work load of this section is about a lakh of prints and 20,000 microfilm strips (each strip covering ten pages) in a year.

The following reprographic equipment are available at INSDOC:

Electrostatic Copying

1. Rank Xerox model 1385
2. Coronostat copier
3. Savin copier
4. Majox

Photography Equipment

1. Microfilm camera
2. Electro microfilm camera
3. Leica Reprovit copying unit
4. Microfilm processing unit
5. Photostat camera
6. Leica camera
7. Autofax
8. Microfilm roll-to-roll contact printer
9. Contact document printer
10. Microfiche camera
11. Microfiche reader
12. Micro card camera.

2(A).7 National Archives of India (NA).

The National Archives of India is considered the richest depository of the nation's records relating to the British period. It possesses several million archives and microfilm copies of records obtained from the India Office Library and other public and private sources in Great Britain. Besides, it has an excellent collection on modern India including a large collection of government publications.

It has also the oldest organised reprographic unit set up under the auspices of the Government of India. No other organisation has reached the volume of microfilming work as done by the NA. It has a continuous programme of microrecording. This unit is equipped with a battery of Recordak cameras and ancillary equipment. But it has yet to put on microfilm, our state records of this century, particularly the bulk of documents created after independence.

2(A).8 National Medical Library (NML)

NML is equipped with a Xerox-Pylorys KS 2. Its reprographic services are open to the users of the library. It also cooperates with other libraries in the field of medical sciences. Indigenously developed diazo paper is used in the Xerox. They charge seventy five paise per impression.

2(A).9 Nehru Memorial Museum and Library (NMML)

The NMML specialises in modern Indian history, starting with Raja Ram Mohan Roy and ending with the Nehru era. It has made special efforts to build up a collection of books by and on Nehru in all Indian and foreign languages. It is a depository of the records of the All India Congress Committee.

It has about 40,000 volumes, 2,435 newspaper files as well as over 35,200 photographs connected with the life of Nehru and Indian National Movement. It subscribes to 213 periodicals.

NMML has an independent reprographic unit which caters to the needs of the research scholars working under its auspices, along with academicians and scholars from other institutions. It has also the following reprographic equipment:

(1) Automatic processing apparatus
(2) Xerox-Pylorys KS 2, manufactured by Varmix Co, Poland
(3) Microfilm reader-cum-printer
(4) Microfilm recorder, manufactured by Karl Zeiss of East Germany.

For photo copies, it charges 50 paise per page.

2(B) Academic Libraries

2(B).1 Indian Institute of Technology (IIT)

IIT in New Delhi has a well-equipped reprographic unit for the use of its students, teachers, and research workers. The following items of equipment are available there:

(1) Photo copying machine - model 55 SCM, manufactured by SCM Corporation of New York
(2) Xerox 1385
(3) Microfilm printer
(4) Microfilm processor
(5) Micro card reader, manufactured by Micromethods, London
(6) Microfilm recordak
(7) Process camera
(8) Coronastat: This machine uses electrofax process. The disadvantage of this process is that the special paper used in the process is not manufactured in

India but is imported.

(9) Offset printer: It is used for obtaining multiple copies.

They also have a photography section which is a separate unit and is well equipped with modern cameras. They charge Re 1/- per impression.

2(B).2 Jawaharlal Nehru University (JNU)

JNU has recently started reprographic services for the use of their research scholars and teachers. Reprographic section is functioning as a part of the Central Library and is equipped with a Xerox Pylorys KS 2 and microfilm readers.

3. Public Libraries

British Council Library

The British Council Library in New Delhi has recently started reprographic services which are open to its members, local libraries and outside research institutions. Their reprographic section has the following equipment:

(1) 3 M Copier 191: this is an automatic photo copier and uses imported paper
(2) Ultrafiche reader PCMI

Their service charge is Re 1/- per page.

The Delhi University Library is also planning to start a reprographic unit which will function as a part of the Central Library and will also cater to the needs of other libraries in the system.

The Indian Council of Social Science Research has also plans to start reprographic services. The library of Social Science Documentation Centre is acquiring material on microforms which is not easily available in the country. Their plans also include the provision of readable microcopies of the required research paper, article or extract.

4. Copyright and Reprography

Copyright is essentially a safeguard designed to ensure economic reward to both authors and publishers for their intellectual labour and investments respectively.

The first copyright act in India was the 'Indian Copyright Act of 1914', based on the British Copyright Act of 1911. India signed the Berne Convention in Brussels in 1948 and the Universal Copyright Convention in 1958. According to the current copyright act of 1957, the period of copyright is the life time of the author and 25 years after his death (compared with the post mortem fifty years formerly required by Berne Convention and amended accordingly after the revision conference of Berne and Universal Copyright Convention which took place in Paris in July, 1971). Section 14 of the Indian copyright act of 1957 sets out the contents of the author's right, therefore it is important for the librarians offering reprographic facilities to know it. This act gives the author exclusive right to reproduce the work in any material form. The reproduction of any copyrighted material, unless it is authorised by the copyright holder, is, therefore, an infringement of the Indian copyright act of 1957.

The published as well as unpublished works can be registered with the registrar of copyrights. The intended purpose of this registration is to help the authors to (a) enforce their rights against exploitation by the publishers; and (b) provide them with proof in order to establish their ownership of the copyright.

Practice at INSDOC

INSDOC requires a person asking for their reprographic services to assume the responsibility of the act of copyrighting. For the periodical articles, only single copies are reproduced and they are meant for personal use.

5. Development of Indigenous Reprographic Equipment

The phenomenal progress abroad in reprographic technology and heavy demand for reprographic equipment have encouraged a number of research organisations, documentation centres, academic institutions and private manufacturers to develop indigenous reprographic technology. Development work in certain directions has been fruitful in the National Physical Laboratory (NPL), Indian Institute of Technology (IIT) (New Delhi) and INSDOC.

The NPL has successfully developed indigenous equipment similar to the first commercially popular design of xerocopying equipment invented by the then, Haloid Xerox Inc in the U.S.A. This is called Xerox type 1385 indicating the maximum size of image as 13 x 8.5", with the electrostatic charging, dry powder developing and heat/vapour fusing units. The NPL has licensed three firms through the National Research Development Corporation (Pvt) Ltd, for the commercial exploitation of xerox copying equipment developed by them. The trade names and the addresses of the manufacturing firms are given below:-

(1) Panaprint Photocopier

(a) Model No. REx-101: reproduction ratio: 1:1, 1:2, 2:1. Processor, camera and developer in three independent units take three minutes to produce a copy. Approximate cost: Rs 27,000.

(b) Model No. DeX-202, reproduction ratio: 1:1

(c) Model No. ECX-303, reproduction ratio: 1:1. It uses any ordinary paper like sunlit bond and takes three minutes to give a copy.

Manufacturers: M/s Advani Oerlikon (Pvt) Ltd,
Radio House, 6, Rampart Road,
Bombay.

They have their regional office in New Delhi.

(2) Majox-121 Electrostatic Copier, Model: 'LIBRARIAN'

The above photocopier can reproduce copies from the original on ordinary sunlit bond paper. It is equipped with a horizontal camera system and special object screen with facility to take direct copy from bound books/magazines up to 3/10" thickness without disturbing the binding. Six different models are available in this range. The above model costs Rs 26,000.

Manufacturer: Macneill & Barry Ltd.,
C-11 Connought Place,
New Delhi 110001

(3) Korestat-171 Photocopier

Five models are available. 'Library' model costs Rs 22,000.

Manufacturer: Kores India (Pvt) Ltd., New Delhi

The advantage of the above machine is that it has adjustable camera like Rank Xerox and the copying ratio can be fixed.

INSDOC has designed an attachment for Xerox 1385 for obtaining Xerox copies from microfilms. It has been registered as a patent. A developing powder for electrostatic processes has also been developed at INSDOC.

IIT, Delhi, has indigenously developed zinc oxide coated paper for electrofax copying.

Diazo paper is being manufactured by Kilburn & Co, with a network of branches in major cities. They also offer reprographic facilities, at these centres, at nominal charges.

6. Import of Foreign Equipment

The import of reprographic equipment from any foreign country is banned by the Government of India. It can be procured only through foreign aid or as a gift.

7. Training Facilities in Reprographic Technology

INSDOC has played a pioneering role in providing training in reprographic technology. A one-year course in documentation, includes a paper which covers systems, processes, methods and techniques of reprography. Besides this regular course, INSDOC organizes some special courses in reprography from time to time.

M/s. Macneill & Barry, New Delhi, also provides part-time training facilities in reprography for candidates sponsored by the libraries and research institutions.

8. Summing Up

Under the present economic conditions, our libraries, research organisations and documentation centres can hardly be expected to be adequatately equipped with suitable reprographic equipment, partly because the import of foreign equipment is banned by the Government. Spare parts for imported equipment are neither available locally, nor can they be imported. ~~The~~ equipment therefore in many institutions and libraries ~~is~~ lying idle. It is suggested that indigenous equipment should be made more popular and manufacturing firms should be given incentives by the Government.

Now indigenous equipment uses locally-made diazo or ordinary sunlit bond paper, the need for imported paper has been eliminated which is an important development.

Since INSDOC is the only agency having training facilities in reprography, it is suggested that CSIR or NPL should assume the responsibility for starting another comprehensive programme of training in reprography, both at central and regional level. Our departments and schools of librarianship attached to a number of universities should also introduce a paper in reprographic techniques which will help solve the shortage of trained technicians in reprography. It is suggested that there should be three separate training programmes in reprography (a) for technicians and operators, (b) for those who are already working in reprographic units, and (c) for managers and executives who are to organise and manage reprographic services.

Great economy can be achieved by means of cooperation amongst the libraries. The demands of all the libraries and documentation centres when pooled together may help programming, not only towards better utilization of the existing services, but also installation of more efficient and up-to-date apparatus. This will provide scope for a wider variety of reproduction work. Microfiche units should be installed under the supervision of CSIR. With their establishment there may be the possibility to handle a larger volume of duplication work and the possibility to make a programme furnishing a large number of manuscripts and rare documents to research workers and scientists.

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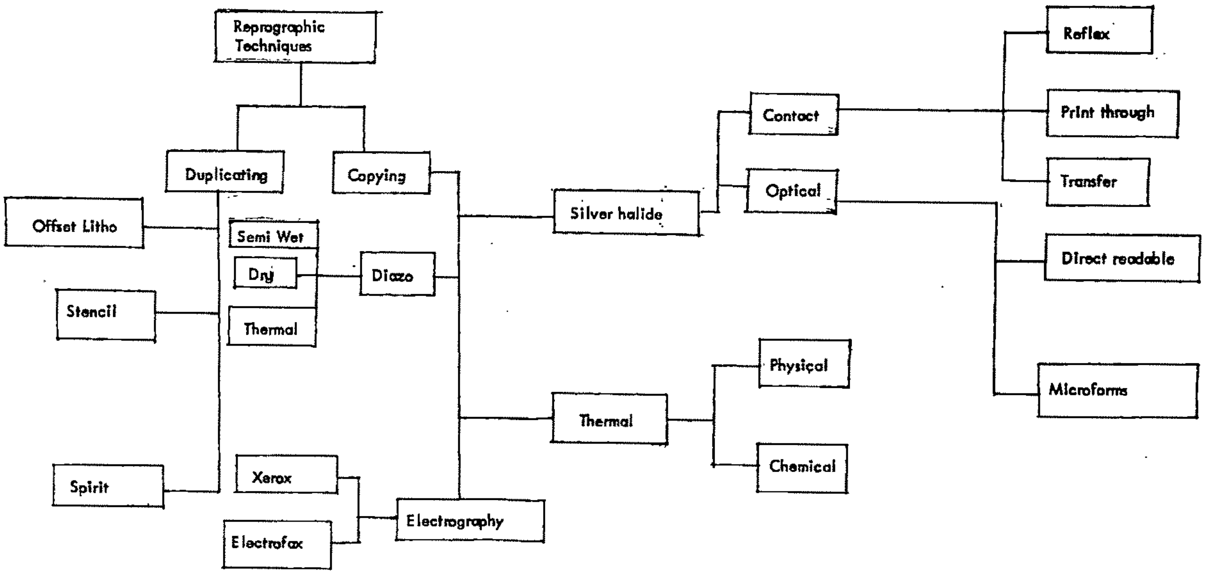
REPROGRAPHIC TECHNIQUES



CHEM/SDI SERVICE: PERFORMANCE OF CAN/SDI SOFTWARE

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Describes the features of CAN/SDI, INDIA PACKAGE and CHEM/SDI Software. Discusses the philosophy for these. Presents the operational data for CHEM/SDI Software on IBM/370 model 155 II. Concludes that the average computer time for servicing a profile at present is 1 mt 6.69 secs. Presents the various outputs of CHEM/SDI Software.

INTRODUCTION

CHEM/SDI service is a computerised SDI (Selective Dissemination of Information) service covering chemistry and allied disciplines. CHEM/SDI is also a pilot project of UNISIST/UNESCO for one year in the region of South Asia covering countries like Iran, Afghanistan, Pakistan, Nepal, Bangladesh, Burma, Sri Lanka and India. There are about 125 users from India, Nepal and Sri Lanka for CHEM/SDI. The service is fortnightly and uses CAC (Chemical Abstract Condensate) magnetic tape supplied by the American Chemical Society. Canada through Unesco provided the software and the training. This software is called CAN/SDI package. India got a subset of CAN/SDI package. CHEM/SDI is currently using a subset of India package which can run under OS-MFT/MVT or OS/VS. The implementation of program package for CHEM/SDI has already been discussed [1]. The present paper discusses the in-situ working of CHEM/SDI software over a period servicing nearly 18 issues of CAC.

Software Design

The current practice in IR (Information Retrieval) software is to develop as general a system as possible so that most of the bibliographic data bases can be used by the system. Since the key program of IR software is 'search program' it is usually written in a very compact form in the systems assembly language. Basically IR package must contain a search program, a program for compiling profile and a program for printing the answer. In an environment of multiple data bases, this approach will require one compile program for profiles and as many search programs as there are data bases and perhaps one print program. As an alternative to this, there is another approach. In this the search, print and compile profile programs are kept invariable and every data base brings with it a conversion program which transforms the format of a data base into that of the search. This approach enables to design an open ended system, keeps the running and other developmental cost at a low level. CAN/SDI uses this approach for providing SDI service to over 2,000 users across Canada from about dozen data bases.

Overview of CAN/SDI System

Annexure 1 presents a chart for the CAN/SDI software package. As stated earlier the package can run under OS-MFT/MVT or OS/VS, OS/TSS on IBM/360 or 370 or a compatible machine. The system requires a core memory of the order of 512 K bytes and the India package can run on 384 K bytes. The peripheral configuration for the package is minimum of three tape drives for 800/1600 BPI, a disk drive, a card reader-punch and an on line printer. CAN/SDI package uses PL/1 and the assembly language. The crucial program of the package viz., search uses assembly languages. It must be stated that various advanced programming concepts have been deftly implemented in the package.

Phases of CAN/SDI System

In general there are five phases in CAN/SDI for providing SDI services. These are

1) Conversion phase;
2) Compile profile phase;
3) Search phase
4) Sort phase; and
5) Print phase

The first two phases constitute the Input and the last phase is the Output of the system. Phases three and four process the SDI bulletin or printouts.

CHEM/SDI Package

CHEM/SDI package is a subset of India package. Originally it contained the following programs:

1. CHEMABS;
2. Compile Profile;
3. Search; and
4. Print

CHEM/SDI uses sort utility program of OS package. During trial runs it was found necessary to add one more program. This program is written in assembler and it checks and prints any errors in the feedback addresses and user address.

Chemabs is the conversion program written in PL/1 for reformatting the CAC into search format which is a modified version of MARC-II format. It has number of routines which are written in PL/1 and same are in Assembler. The program is table driven and uses preprocessor variables.

Compile profile program is a PL/1 program. It tests profile terms along with the alpha codes and generates search expressions. These search expressions are a version of pseudo instructions which form a part of input to search program.

Search program is in assembler and is made up by several macros. It takes a maximum of 50 profile in a single pass and runs the records from the converted data bases.

Print program is a PL/1 program. It uses the sorted hits, the user address and the feedback address as input. As output the SDI print out in either a single or double column printing together with operational data punched on cards are produced.

CHEM/SDI flow chart is given in annexure 1.
In the subsequent treatment, an attempt will be made to present the performance of CHEM/SDI software on IBM/370 model 155-II installed at the computer centre of I.I.T. Madras.

Inputs

The CHEM/SDI package accepts two inputs. These are

a) CAC data base; and
2) Profile information

Data Base

The CAC data base is air flown to India. The package has already processed 18 issues of CAC 1976 vol. 84. The CAC tape issue is in SDF (Standard Distribution Format). The publishers are Chemical Abstracts Service, Ohio University, Columbus. It comes with standard label in 1600 b p i tapes. The description of a record of CAC is as follows:

Description

A record in Standard Distribution Format is in OS/360 variable length blocked form. Maximum record length is 3516 bytes, maximum block size is 3520 bytes. Tapes are unlabelled and in ASCII character representation.

A record in SDF is analogous to a record in the MARC II format in that it consists of three parts: a leader, directory and text.

A. Leader - First 8 bytes of every record.
Bytes 1-4: Overall record length. This field is accessible only to the OS data management system.
5-6: Reserved for future use. Current value is hex '00'
7: Record modification code used by CAS software system.
8: A number whose binary value equals the number of entries in the directory.

B. Directory - Each entry in the directory is 8 bytes long. There are as many directory entries as there are items in the text.
Bytes 1-2: Tag identifier (in hexadecimal notation).
3: Bits 1-4: Code to indicate storage mode of the text associated with the tag identifier. Current values for this field are:
0111 - ASCII (7 bit ASCII with 8th bit 0)
1001 - Arbitrary bit string or byte string.

Bits 5-8: If the length of the text being pointed to is longer than 4 bytes, then these bits have the value of '0000'. If length of text is 4 bytes or less, then value stored is this length in binary form. The actual text in this latter case is stored in bytes 5-8 of the directory entry.
4: Tag I. D. modifier. If at any time the specification of the Tag ID changes, then this modifier is changed to flag the revision. This byte is also used as a counter in

multiple entry fields. Eg., if we have 3 authors, there will be 3 directory entries with a tag ID for author, but byte 4 of the entries will contain hex 1, 2, and 3 respectively.

5-6: A number whose binary value is the starting address of the text relative to the beginning of the record (counting begins with zero).

7-8: A number whose binary value is equal to the exact length in bytes of the piece of text being pointed to.

Note: The above description of bytes 5-8 apply provided that bits 5-8 of byte 3 have the value '0000'. If those bits have any other value, then bytes 5-8 contain the actual text (left justified).

C. Text - There are a varying number of text items, each of which can be of varying length. Storage mode of a text field is indicated by bits 1-4 of byte 3 of the directory entry for that text.

CAC Tag Identifiers

The following list gives the CAC tag identifiers in decimal form, along with what they point to. For more detailed description of these data elements, refer to the CAS publication 'Data Content Specifications for CA Condensates in Standard Distribution Format'.

Note: Data elements flagged with '*' below are not included in the NRC data base.

*	18	Sequence number
*	84	Temporary abstract number (TAN)
	85	CODEN
	86	Publication classification code
	89	Authors - up to 10 personal authors - up to 10 corporate authors
	90	Location of work (usually author affiliation)
	91	Document title
	92	Original (foreign) book title
	93	Abbreviated title of publication, or the country of a patent
	94	Publication date
	95	Series/volume number
•	96	Issue/report/part number
	97	Pagination
*	98	Country of patent application or priority code
	99	Original language (both a code and a language name)
	100	Availability
	101	Price
	102	CAS publication citation
	103	CAS publication section/subsection
	107	CAS coverage
*	109	Copy abstract, parent journal, or book review citation
	111	Date of meeting or volume
	112	Patent number
	113	Patent assignee
	114	Patent classification number
	115	Date of patent application or priority
	116	Publisher
	119	Keyword phrase
*	325	Record creation date
*	328	Data element ID frequency count(s)
*	329	File key description
*	330	CAS issue(s) identification
*	331	Tape format escape code
*	332	Number of file units
	789	Patent application or priority number.

Profile

A profile is a list of keywords and other related words. Each of these words are preceded by a two letter alpha code. Each profile has a mailing address and a maximum of ten expressions. Maximum number of profile terms is restricted to 200. Each expression is allowed to retrieve 99 references from a data base. This means that a user can have a bibliography with maximum of 990 references.

Expressions are formed by using Boolean logic on the profile term code. These are alpha codes connected by 'or' '/', 'AND' '+', 'Through' '-', 'AND NOT' '¬', and 'inclusive' '( )' symbols.

Annexure 3 gives the filled in proforma for collecting the profile information. Annexure 4 gives the coded version of this profile. Annexure 5 gives the 'Profile listing' as processed by 'Compile Profile' program.

Operating CHEM/SDI Software

The following operations are needed to produce one SDI printout:

1) Receive the tape;
2) Convert the tape;
3) Update the profile file;
4) Search the tape;
5) Sort the hit file;
6) Print the sorted hit file profile wise; and
7) Collected the statistical card punched by package

Receive Tapes

CAC Tapes are received on a weekly basis as even and odd numbered tapes. These tapes are processed on a two weekly basis i.e. one odd and one even tape.

Conversion

Two CAC tapes, one even and one odd, are transformed into the search format consequtively.

That is to say issues 1&2, 3&4, etc. are converted into search format simultaneously by using 'CHEMABS' program. The table below gives the execution timings for the runs of Chemabs so far taken:

Table 1: Execution Timing of Confersion Phase Chemabs

Run No.	CAC Tape V.No.	CAC Tape Is.No.	No. of MARC Records created	CPU Time Min.	CPU Time Sec.
1	84	1	5407	11	48.86
2	84	2	6751	16	34.94
3	84	3	5582	12	17.35
4	84	4	7860	17	21.24
5	84	5	5903	13	37.11
6	84	6	6937	16	22.98
7	84	7	6226	14	15.33
8	84	8	8969	21	45.94
9	84	9	6365	14	19.30
10	84	10	9108	20	21.90
11	84	11	5501	13	21.49
12	84	12	9168	22	31.64
13	84	13	6790	15	17.52
14	84	14	8359	18	46.28
15	84	15	7131	15	48.39
16	84	16	9406	21	13.20
17	84	17	6870	16	11.78
17	84	18	7611	17	45.82

Compile Profile

The profiles to be processed by the 'Compile Profile' program. This program checks for the format errors and the incorrect use of the logical connectors 'OR, AND, AND NOT'. Incorrect profiles are skipped with appropriate error message. The skipping commences from the point of detection of the first error and subsequent profile is not checked. The terms in each of the correct profiles are entered into a term table with apt symbolic identifiers. The expressions are compiled into pseudo instructions using the logical operators as op-codes and addresses of terms in the term Table as operand. These are entered in Code Tables with appropriate profile identifiers. A file of Term Table and Code Tables with appropriate profile identifiers is created for all correct profile. A listing of all the profiles alongwith error messages for incorrect profiles is printed out. The profiles can be updated, added or deleted. Annexure 5 gives a sample profile listing.

Compiled profile file is an input to the search program. This program is run as frequently as required.

Search

The search program is run once in a fortnight. It operates on the files generated by compile profile program and the Chemabs program. Real bits are put on for the hit records. It selects a record only once for a profile irrespective of the fact that the record may be selected by more than one expression of the profile. The execution timings of the search phase are given in the next page.

Table 2: Execution for the Sort Phase

Run No.	No. of Profiles	No. of Records Sorted	CPU Time Min.	CPU Time Sec.
1	30	3030	0	12.25
2	33	4910	0	16.22
3	57	8104	0	23.56
4	73	9790	0	27.73
5	7	736	0	5.02
6	21	2356	0	8.76
7	83	5103	0	16.77
8	90	8662	0	25.32
9	104	17878	0	54.01
10	109	18742	0	55.32
11	114	17548	0	53.64
12	115	14728	0	43.73
13	116	16292	0	48.18
14	118	15828	0	46.83

Table 3: Execution of the Print Phase

Run No.	No. of Profiles	No. of Records Sorted	No. of Lines Printed	CPU Time Min.	CPU Time Sec.
1	30	3030	10,250	1	43.37
2	7	736	5,250	0	54.27
3	33	4910	34,950	5	28.31
4	57	8104	38,550	6	57.77
5	73	9790	59,450	11	39.62
6	21	2356	16,750	2	41.97
7	83	5103	29,650	4	25.70
8	90	8662	62,750	9	51.28
9	104	17878	1,01,450	16	13.74
10	109		39,150	11	42.57
11	109			3	46.91
12	109	18742	D.S.O.	17	40.04
13	109			9	51.71
14	114	17548	D.S.O.	17	20.97
15	115		10,650	1	52.51
16	115		D.S.O.	9	01.39
17	115	14728	D.S.O.	7	54.87
18	115		D.S.O.	1	23.88
19	115		21,050	8	12.33
20	116	16292	D.S.O.	9	46.28
21	116			12	45.69

D.S.O. = Direct System Output. No statistics of lines spooled could be found at the end of job, but could be found out only while running S.M.F. for billing.

Table 4: Execution Time for the Search Phase

Run No.	Data Base CAC Vol. 84 Is. No.	No. of Profiles	No. of Expressions	No. of 'Code' instructions	No. of terms	No. of duplicate terms	No. of almost duplicate terms	No. of MARC records	No. of hits	CPU Time Min	CPU Time Sec
1	1	30	109	4681	1095	187	419	5407	1515	2	2.62
2	1&2	7	18	632	174	2	8	12158	368	2	14.77
3	1&2	33	112	5417	1263	290	549	12158	2455	4	50.12
4	1&2	57	148	6271	1650	387	810	12158	4052	5	40.98
5	3&4	73	222	9694	2342	693	1462	13442	4895	8	11.24
6	3&4	21	70	4216	1000	153	310	13442	1178	4	47.34
7	5	83	271	12669	3126	941	2063	5903	2551	4	26.40
8	6	90	307	15608	3464	1125	2372	6937	4331	6	06.31
9	7&8	104	349	19327	4336	1607	3246	15195	8939	15	13.93
10	9&10	109	367	21068	4896	1836	3702	15473	9371	16	48.30
11	11&12	114	385	22796	5384	2080	4227	14669	7416	17	03.69
12	13&14	115	390	23400	5452	2169	4397	15149	7364	18	14.87
13	15&16	116	391	23524	5705	2184	4448	16537	8146	19	47.35
14	17&18	118	407	24997	6024	2330	4687	14481	7914	18	35.42

Sort

The search program gives all the bits on a file called SDI ANS. This file is sorted by passing on the required parameters to the IBM utility program called SORT available in all OS. The bits are sorted by profile numbers, expression numbers etc. The execution times of the sort phase are given in Table 2 in the previous page.

Print

The Print program does the last job of SDI system viz. the printing on hard copy. This program takes the longest time as per the clock time. It puts each record in a predetermined format and prints in double column. Annexure 6 gives a sample SDI print out from the CHEM/SDI software. Print program requires special stationery and special carriage control tape. The input files are SDIANS, USERS ADDRESS, FEED BACK ADDRESS. The output are the SDI printouts and the statistical data card. Table 3 in the previous page gives the execution times of this programe:

System's Performance

The execution time for each phase has been presented in the foregoing description. The overall performance and the computer time utilisation can be had from the monthly bills paid since March 1976. Table 5 gives the time actuals for producing a SDI printout:

The average time required to service a profile is 1. mt. 03.73 secs. This average is calculated over the period March-May 1976 as February 1976 was the trial month.

Conclusions

We had presented the performance and execution times required for running CHEM/SDI service. The average computer time in terms of CPU time is 1 mt 06.69 sec. It must be stated that this time is largely dependent on the profiling work which falls under the domain of Search Editing. Proper search editing can reduce the time appreciably and vice-versa. From the view point of the computer operations it must be emphasised that an operator must be throughly familiar with not only the programs but also with the package. A specialised training is needed even for an experienced programmer. CAN/SDI software and India package is a powerful IR tool and should be used extensively on other data base like INIS, MEDLARS, IFS etc. It will be a wastage of effort and time if an attempt is made to write a

Table 5: Time Actuals for Producing an SDI Printout OUT

Month	Total Runs	Cards Read	Lines Printed	Cards Punched	Charg. CPU	Profiles	Average CPU Time/Profile
Feb.	52	4610	24152	771	41 Mts.	15	2 Mts. 44 Secs. *
March	58	24063	188363	217	145 Mts	48	1 Mt. 30.64 Secs.
April	49	15277	158285	206	104 Mts 17 Secs.	73	42.86 Secs.
May	39	14052	368874	29	229 Mts.	103	1 Mt. 6.69 Secs.

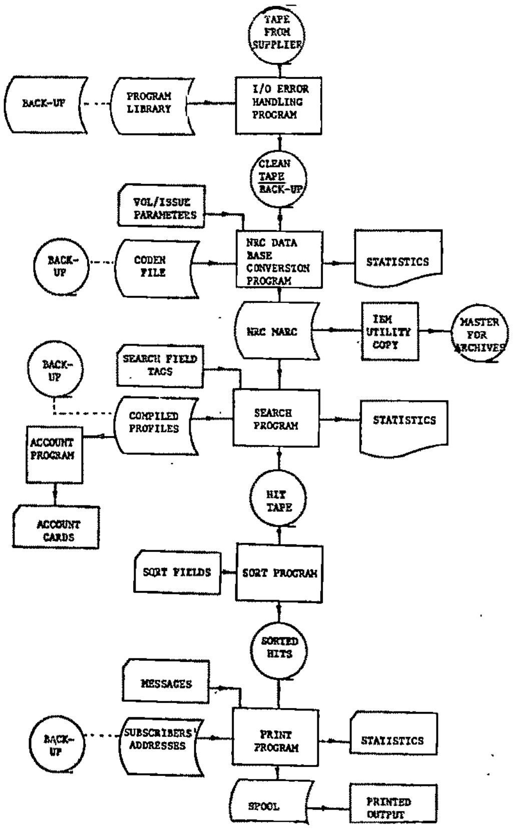
* Includes trial run.

search program for these data bases even on an experimental basis. However, this effort should be diverted for developing a software for smaller machines. It will be economical to obtain computer version of CAN/SDI package and modify it to Indian environment. It is essential that this study coupled with costing may be continued atleast for the duration of the project so that proper realistic estimates could be drawn in case India decides to go on its own.

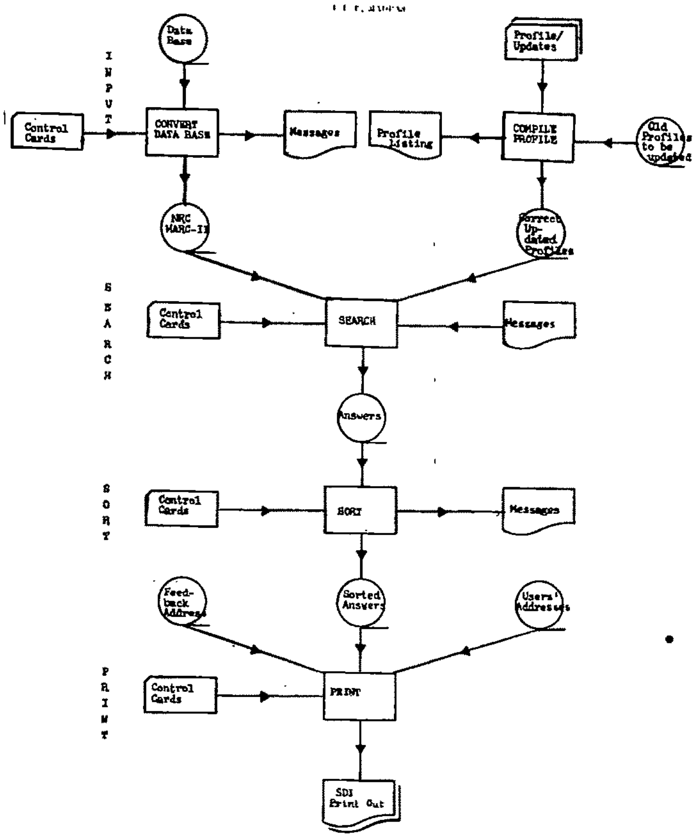
Acknowledgements

Authors are indebted to Shri S. Parthasarathy and Prof. H.N. Mahabala for providing opportunities and facilities for conducting this study.

ANNEXURE 1



ANNEXURE 2



ANNEXURE 3

PROFILE INFORMATION

1. Name: **Dr S K Chopra**
2. Position: **Principal Scientist** Telephone: **621770; 88-316**
3. Institution: **Cement Research Institute of India**
4. Address: **M-10 South Extension II**
   New Delhi 110049

5. Topic (Please give a fairly detailed description of your field of interest, including any aspect not required).

   Use of industrial by-products in the manufacture of cement and cement products including concretes, ceramics, glass and allied products

6. Please give section nos. of Chemical Abstracts (listed on the reverse) in which the above topic usually occurs.

   43, 49, 53, 54, 55, 56, 57, 58, 59, and 60.

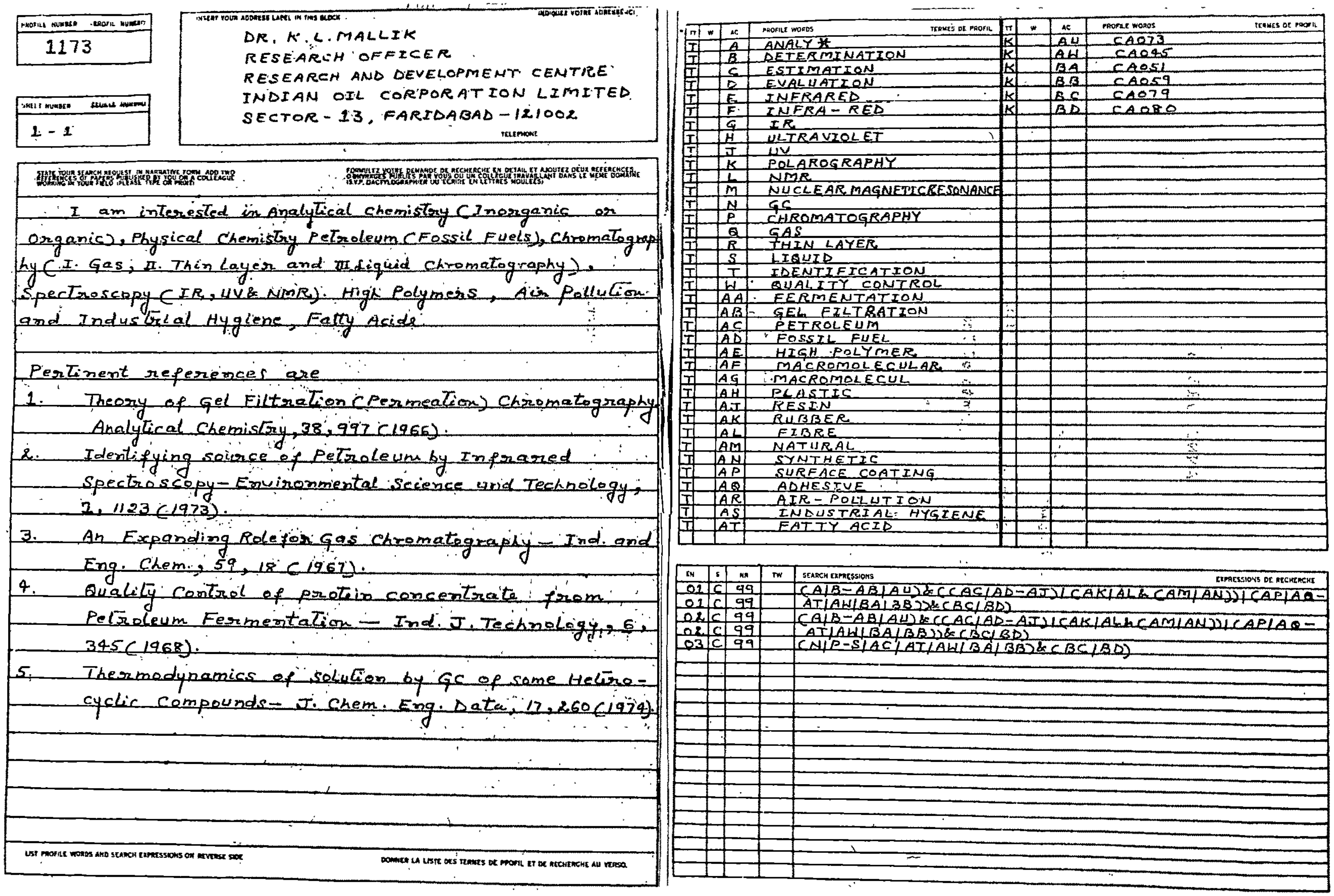
7. Keywords pertaining to the above topic (general terms, such as 'Metals' should be expanded to the particular metals in which you are interested).

   Fly ash; blast furnace slag; colliery spoil; China clay/waste; slate waste; pulverised fuel ash; by-product calcium sulphate; steel slag; metallurgical slags; lead-zinc slags; copper slag; tin slag; red mud; mine tailings; quarrying wastes; waste glass; furnace bottom ash; furnace clinker; incinerator ash; Tin mine tailings; fluorspar mine tailings; colliery shale; phosphogypsum; fluorogypsum; fluor anhydrite;

8. Please list citation of at least five titles of relevant papers relating to the above topic.

   1. A survey of the locations, disposal and prospective uses of the major industrial by-products and waste materials: GUTT, W.; NIXON, P. J.; SMITH, M. A.; HARRISON, W. H.; and RUSSELL, A. D. : Building Research Establishment Current Paper CP 19/74, 81p.
   2. Manufacture of cement from industrial by-products: GUTT, W. Chemistry and Industry, February 1971, (7), 189-97.
   3. Aggregate from waste materials: GUTT, W. Chemistry and Industry, June 1972, (11), 439-47.

ANNEXURE 4



PROFILE NUMBER · NUMÉRO DE PROFIL
1173

SHELF NUMBER
1 - 1

INSERT YOUR ADDRESS LABEL IN THIS BLOCK — INDIQUEZ VOTRE ADRESSE ICI

DR. K. L. MALLIK
RESEARCH OFFICER
RESEARCH AND DEVELOPMENT CENTRE
INDIAN OIL CORPORATION LIMITED
SECTOR - 13, FARIDABAD - 121002

TELEPHONE

STATE YOUR SEARCH REQUEST IN NARRATIVE FORM. ADD TWO REFERENCES OF PAPERS PUBLISHED BY YOU OR A COLLEAGUE WORKING IN YOUR FIELD (PLEASE TYPE OR PRINT)

FORMULEZ VOTRE DEMANDE DE RECHERCHE EN DETAIL ET AJOUTEZ DEUX REFERENCES D'OUVRAGES PUBLIES PAR VOUS OU UN COLLEGUE TRAVAILLANT DANS LE MEME DOMAINE (S.V.P. DACTYLOGRAPHIER OU ECRIRE EN LETTRES MOULEES)

I am interested in Analytical chemistry (Inorganic or Organic), Physical Chemistry Petroleum (Fossil Fuels), Chromatography (I. Gas, II. Thin layer and III liquid chromatography), Spectroscopy (IR, UV & NMR). High Polymers, Air Pollution and Industrial Hygiene, Fatty Acids

Pertinent references are

1. Theory of Gel Filtration (Permeation) Chromatography Analytical Chemistry, 38, 997 (1966).
2. Identifying source of Petroleum by Infrared Spectroscopy — Environmental Science and Technology, 7, 1123 (1973).
3. An Expanding Role for Gas Chromatography — Ind. and Eng. Chem., 59, 18 (1967).
4. Quality Control of protein concentrate from Petroleum Fermentation — Ind. J. Technology, 6, 345 (1968).
5. Thermodynamics of solution by GC of some Hetero-cyclic Compounds — J. Chem. Eng. Data, 17, 260 (1974).

LIST PROFILE WORDS AND SEARCH EXPRESSIONS ON REVERSE SIDE — DONNER LA LISTE DES TERMES DE PROFIL ET DE RECHERCHE AU VERSO.

TT	W	AC	PROFILE WORDS — TERMES DE PROFIL	TT	W	AC	PROFILE WORDS — TERMES DE PROFIL
T		A	ANALY *	K		AU	CA073
T		B	DETERMINATION	K		AH	CA045
T		C	ESTIMATION	K		BA	CA051
T		D	EVALUATION	K		BB	CA059
T		E	INFRARED	K		BC	CA079
T		F	INFRA - RED	K		BD	CA080
T		G	IR				
T		H	ULTRAVIOLET				
T		J	UV				
T		K	POLAROGRAPHY				
T		L	NMR				
T		M	NUCLEAR MAGNETIC RESONANCE				
T		N	GC				
T		P	CHROMATOGRAPHY				
T		Q	GAS				
T		R	THIN LAYER				
T		S	LIQUID				
T		T	IDENTIFICATION				
T		W	QUALITY CONTROL				
T		AA	FERMENTATION				
T		AB	GEL FILTRATION				
T		AC	PETROLEUM				
T		AD	FOSSIL FUEL				
T		AE	HIGH POLYMER				
T		AF	MACROMOLECULAR				
T		AG	MACROMOLECUL				
T		AH	PLASTIC				
T		AJ	RESIN				
T		AK	RUBBER				
T		AL	FIBRE				
T		AM	NATURAL				
T		AN	SYNTHETIC				
T		AP	SURFACE COATING				
T		AQ	ADHESIVE				
T		AR	AIR - POLLUTION				
T		AS	INDUSTRIAL HYGIENE				
T		AT	FATTY ACID				

EN	S	NR	TW	SEARCH EXPRESSIONS — EXPRESSIONS DE RECHERCHE
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01	C	99		AT|AW|BA|BB))&(BC|BD)
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02	C	99		AT|AW|BA|BB))&(BC|BD)
03	C	99		(N|P-S|AC|AT|AW|BA|BB)&(BC|BD)

ANNEXURE 5

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T           B DETERMINATION                                                     1173
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T           F INFRA-RED                                                         1173
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T           J UV                                                                1173
T           K POLARAGRAPHY                                                      1173
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T           M NUCLEAR MAGNETIC RESONANCE                                        1173
T           N GC                                                                1173
T           P CHROMATOGRAPHY                                                    1173
T           Q GAS                                                               1173
T           R THIN LAYER                                                        1173
T           S LIQUID                                                            1173
T           T IDENTIFICATION                                                    1173
T           W QUALITY CONTROL                                                   1173
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T          AE HIGH POLYMER                                                      1173
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T          AG MACROMOLECUL*                                                     1173
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T          AS INDUSTRIAL HYGENE                                                 1173
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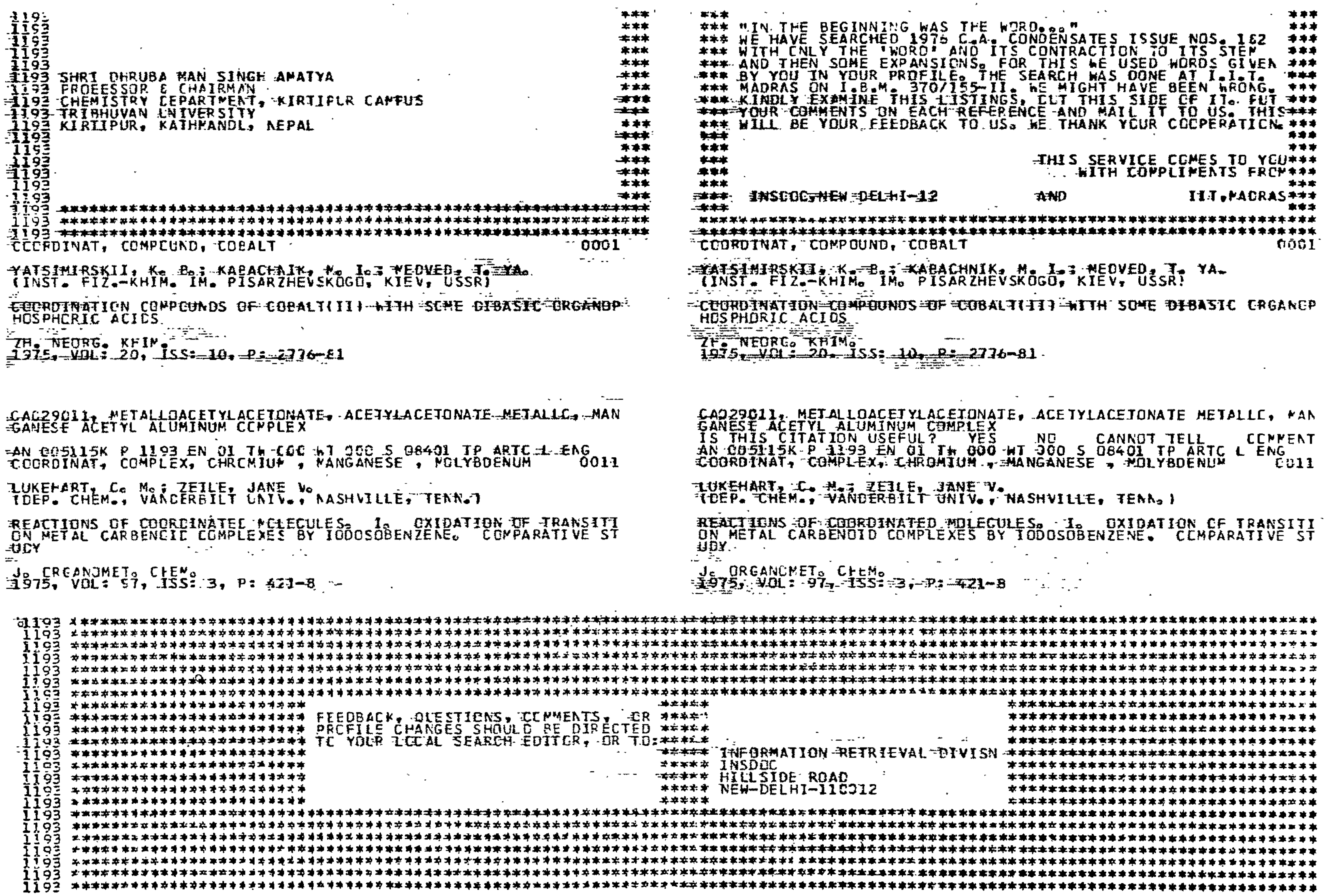
ANNEXURE 6



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1193 PROFESSOR & CHAIRMAN                                       ***
1193 CHEMISTRY DEPARTMENT, KIRTIPUR CAMPUS                      ***
1193 TRIBHUVAN UNIVERSITY                                       ***
1193 KIRTIPUR, KATHMANDU, NEPAL                                 ***
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COORDINAT, COMPOUND, COBALT                                    0001

YATSIMIRSKII, K. B.; KABACHNIK, M. I.; MEDVED, T. YA.
(INST. FIZ.-KHIM. IM. PISARZHEVSKOGO, KIEV, USSR)

COORDINATION COMPOUNDS OF COBALT(II) WITH SOME DIBASIC ORGANOP
HOSPHORIC ACIDS

ZH. NEORG. KHIM.
1975, VOL: 20, ISS: 10, P: 2776-81


CA029011, METALLOACETYLACETONATE, ACETYLACETONATE METALLC, MAN
GANESE ACETYL ALUMINUM COMPLEX

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COORDINAT, COMPLEX, CHROMIUM , MANGANESE , MOLYBDENUM        0011

LUKEHART, C. M.; ZEILE, JANE V.
(DEP. CHEM., VANDERBILT UNIV., NASHVILLE, TENN.)

REACTIONS OF COORDINATED MOLECULES. I. OXIDATION OF TRANSITI
ON METAL CARBENOID COMPLEXES BY IODOSOBENZENE. COMPARATIVE ST
UDY

J. ORGANOMET. CHEM.
1975, VOL: 97, ISS: 3, P: 421-8
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***                                                             ***
*** "IN THE BEGINNING WAS THE WORD..."                          ***
*** WE HAVE SEARCHED 1975 C.A. CONDENSATES ISSUE NOS. 1&2       ***
*** WITH ONLY THE 'WORD' AND ITS CONTRACTION TO ITS STEM        ***
*** AND THEN SOME EXPANSIONS. FOR THIS WE USED WORDS GIVEN      ***
*** BY YOU IN YOUR PROFILE. THE SEARCH WAS DONE AT I.I.T.       ***
*** MADRAS ON I.B.M. 370/155-II. WE MIGHT HAVE BEEN WRONG.      ***
*** KINDLY EXAMINE THIS LISTINGS, CUT THIS SIDE OF IT. PUT      ***
*** YOUR COMMENTS ON EACH REFERENCE AND MAIL IT TO US. THIS     ***
*** WILL BE YOUR FEEDBACK TO US. WE THANK YOUR COOPERATION.     ***
***                                                             ***
***                                                             ***
***                                    THIS SERVICE COMES TO YOU***
***                                     WITH COMPLIMENTS FROM***
***                                                             ***
***  INSDOC,NEW DELHI-12               AND            IIT,MADRAS***
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COORDINAT, COMPOUND, COBALT                                    0001

YATSIMIRSKII, K. B.; KABACHNIK, M. I.; MEDVED, T. YA.
(INST. FIZ.-KHIM. IM. PISARZHEVSKOGO, KIEV, USSR)

COORDINATION COMPOUNDS OF COBALT(II) WITH SOME DIBASIC ORGANOP
HOSPHORIC ACIDS

ZH. NEORG. KHIM.
1975, VOL: 20, ISS: 10, P: 2776-81


CA029011, METALLOACETYLACETONATE, ACETYLACETONATE METALLC, MAN
GANESE ACETYL ALUMINUM COMPLEX
IS THIS CITATION USEFUL?   YES     NO    CANNOT TELL     COMMENT
AN 005115K P 1193 EN 01 TW 000 WT 000 S 08401 TP ARTC L ENG
COORDINAT, COMPLEX, CHROMIUM , MANGANESE , MOLYBDENUM        0011

LUKEHART, C. M.; ZEILE, JANE V.
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J. ORGANOMET. CHEM.
1975, VOL: 97, ISS: 3, P: 421-8
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A DECADE OF RISING SUBSCRIPTION RATES OF INDIAN, BRITISH AND U.S. CHEMICAL JOURNALS A PRELIMINARY ANALYSIS

D. Kumar
Indian Institute of Petroleum
Dehra Dun

An estimate of the rising subscription rates of scientific and technical journals is presented. For the objective review of subscription policy to each journal three factors — utility percentage, subscription rate, and trend of price rise, have been suggested to be taken into consideration.

Introduction

Subscription rates of the scientific journals have been increasing rapidly, and a stage may well arrive when the library funds will not be able to meet their costs. The foremost reason for the price rise of journals is the general inflation causing the printing of material, packing and transportation and cost of human labour to become exorbitant. Many journals have broadened their scope of coverage, and consequently increased the number of articles going into them. Some periodicals, under the force of advancing science and inter-disciplinary interaction, have split up into separates.

The rising cost of journals and also their proliferation have drawn the attention of the library authorities to the necessity of reducing the number of subscriptions and reviewing the future subscription policy. The obvious policy of deletion of periodicals is not easy, especially where the clientele is drawn from more than one discipline. Hence, the study of price trend of journals has become relevant and important, so that a proper acquisition policy may be framed and the library budget prepared accordingly. As such, an attempt has been made in this article to study the price trend of chemical journals subscribed to by our library over the last ten years.

The journals subscribed are mainly of American, British and Indian origin. Journals of other countries are very few, and have not therefore been taken into the present analysis.

American Periodicals

The maximum number of American chemical journals subscribed to is 16, since 1964. Keeping as 100 the price index of periodicals in 1964, 'price relatives' of these journals have been calculated as shown in Table 1. Price relative of a journal in a year $= \frac{\text{Current price}}{\text{Price in 1964}} \times 100$. Their index numbers are showing an upward tendency. Prices of these journals have more than doubled in the year 1970, i. e., after six years.

Here the minimum price rise is 4.5% in the year 1969 and the maximum is 45.7% in the year 1972. A similar rise of 43.2% was found in the year 1968. If we take the average of these index numbers, it gives 18.2 per cent average annual price rise. As such, we expect the price index to touch 391 points in the year 1980. This growth has been shown in Fig. 1, with the help of a bar diagram.

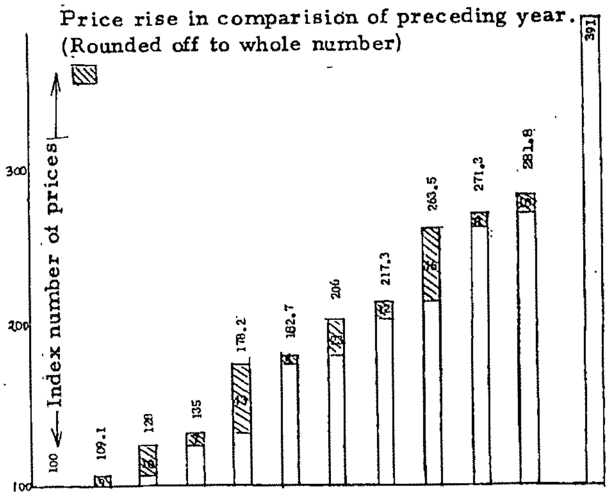


Fig. 1 - American Periodicals

Since conversion charges of foreign currencies vary from time to time, the prices have been kept in the original currencies of the countries under study.

Indian Periodicals

Using the same method, we find the prices of Indian journals have increased at an average rate of 15.45%. Maximum rise has been 55.2% in the year 1970 and the minimum of zero rise in the year 1966 and 1971. Here also, prices have more than doubled after six years, i.e.. 1970, when the rise is steep. The price trend of some Indian journals in the field of chemistry and chemical engineering has been given in Table 2.

Though the prices have been found stationary at two points the tendency is upward with 15.45% average rise. As such, this may touch nearly 350 points in the year 1980. The yearly rise in the average price index, and the actual index in comparison to 1964, have been shown in Fig. 2.

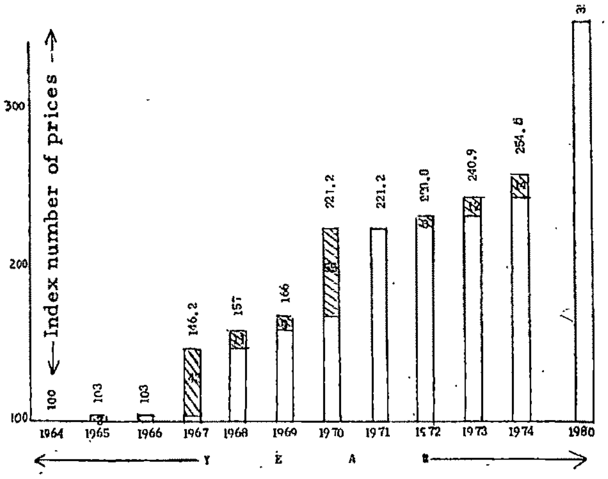


Fig. 2 - Indian Periodicals

British Periodicals

Now, coming to the journals of British origin, we find that these journals have shown the highest rise in comparison to the Indian and American journals considered earlier. We find that the price rise of these journals in 1971 has been almost equal to the price rise of Indian and American journals, but has tremendously increased in 1972, when the rise is 68.3%. Further, this rise is maximum in the entire period of 10 years from 1965 to 1974. This price rise of 68.3% is maximum not only among the British journals but among the British, American and Indian journals put together as well. (Table 3).

An average rise in the prices during the last decade of British chemical journals has been 24% which is also maximum among all the three categories of origin of these journals, as against 18.2%, the average price of rise of American journals, and 14%, the average price rise of Indian journals. As such, it is expected that the British journals may touch 475 points in the year 1980. This has been shown in Fig. 3.

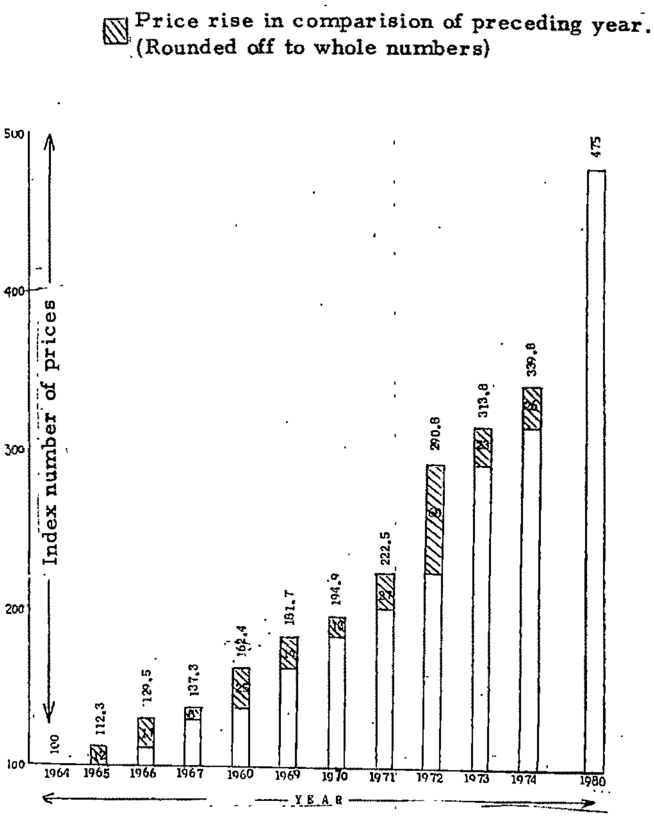
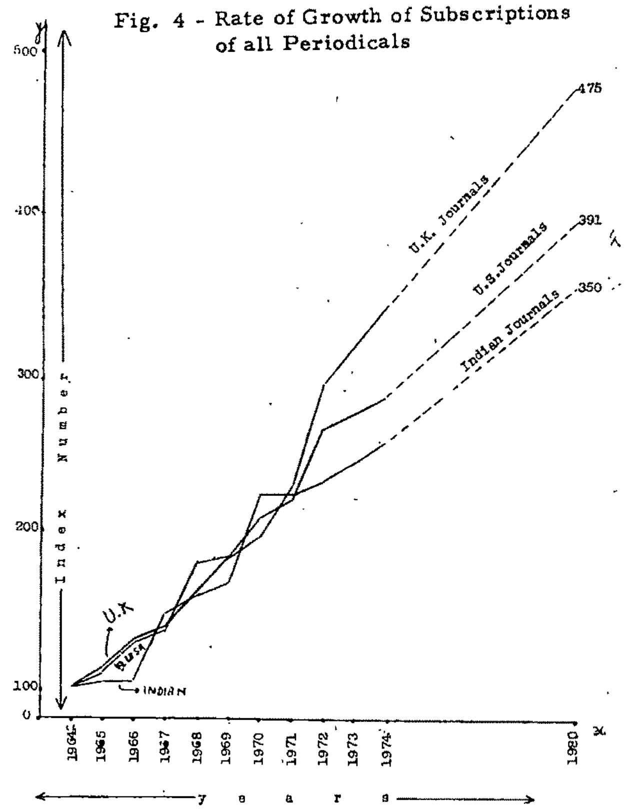


Fig. 3 - British Periodicals

Price Trend as a Whole

If we draw a combined graph of these index numbers as shown in Fig. 4, we find that the curves intersect one another at various points; which shows that the countries not intending to increase the prices of journals were compelled, one way or another, to increase the prices of the journals. Indian journals which were maintaining their prices nearly uniform up to 1966, had to increase by 46.2% in the year 1967. Thus, the graph of the Indian journals has not only become almost equal in 1967 but has slightly gone above the graphs of the British and the American journals, but thereafter (after 1967) it has been overtaken by both the other curves at the next year, i.e., 1968. In 1971 all the three curves are more or less concurrent, but from the next year they have begun to diverge widely in different directions, probably because of the differing national conditions of those countries. Journals of British origin have shown a significant rise after 1971 and thereby have traced a separate path at a much higher level than the American and Indian journals.

Fig. 4 - Rate of Growth of Subscriptions of all Periodicals



Suggested Measures for Renewal of Subscription

Though this study is with reference to chemical journals only, it is hoped that the growth in prices of other journals should be more or less similar to that of the chemical journals because the inflationary effect on the factors of production of these journals is expected to be of the same extent. If the price trend remains the same, a library must get additional funds for subscribing to the same number of journals to absorb the additional expenditure on account of rise in their subscription rates. Further, for estimating the budget, the journals subscribed must be categorised countrywise. Supplementary budget at the rate of 24% for the British journals, 18.2% for American and 14% for Indian journals should be added to the expenditur of previous year.

But, on account of the limitations of funds, it may not be possible to get the additional funds at the rate calculated above, if all the journals have to be renewed year after year. This situation poses the problem of choosing the journals and including them for subscription, so that the library authorities get the best out of these journals under budget restrictions and drop the less useful ones. A suitable system of evaluation of journals from the point of view of their utility, has to be evolved. For this exercise, we have considered the 'utility assessment' slips, pasted on the inside front cover of the journals, as a criterion of value in the selection of the journals. As you are aware, readers browsing the journals in the library are expected to use the utility slips indicating the articles or items of their interest. An analysis of these slips pertaining to the chemical engineering journals for the year 1974 revealed interesting percentages of use (Table 4).

Thus, while considering renewal of subscription to journals the following factors are kept in view: (i) Utility percentage; (ii) Subscription charges; and (iii) Trend of price rise of each journal.

A criterion for renewal of subscription on the basis of utility percentage is suggested below which will be useful.

S. No.	Utility percentage	Suggestion for renewal
1.	Above 50%	Subscription may be renewed.
2.	50% and below up to 25%	Require careful consideration for renewal and constant watch over the usefulness.
3.	25% and below	Subscription to such journals should be stopped and the subscription so saved to be diverted to books, reports and standards of value to the Institute's R&D, or to be utilised on better known journals.

On the basis of the above criterion, we get an indication that the subscription to the journals (1) Indian Journal of Biochemistry, (2) Science and Culture, (3) Tetrahedron, all showing nil utility, and the Butane-Propane News and Current Engineering Practice, with utility 25%, should be stopped and subscriptions to (1) A. I. Ch. E. Journal, (2) Chemical Week and (3) Chemistry and Industry, all having utility between 25% to 50%, should be renewed.

Now, coming to the subscription charges, it has been observed that certain publishers charge high subscription rates for their journals in highly specialised areas. For example, 'Tetrahedron' is the costliest journal, from the list of the British journals, while its utility is 'NIL', from the assessment slips. Thus, it is a matter for consideration whether this journal should be continued, in case its coverage is mostly obtainable from the less costly British publications. After all, any stray article of interest in any journal can be procured as a photocopy.

Therefore, the library authorities have also to consider the subscription charges vis-a-vis their utility assessment, and substitute for costly journals, if required. In this regard, cooperation from readers to choose substitutes is of great importance. Similarly, the journals where subscription charges are rising sharply in comparison to others, a careful watch is to be kept, and the moment it is felt that their subscription can be diverted to some other less expensive but equally useful and informative journal, it should be considered for implementation.

Acknowledgement

My thanks are due to Shri B. Garudadwajan for his kind suggestion and guidance and to Dr. R. K. Srivastava for his encouragement in the preparation of the paper.

Table 1

Price Relatives (Base Year 1964 = 100)

U.S. Journals	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
1. A.I.Ch.E. Journal	100 (\$ 27.00)	100	100	100	100	137	137	137	192.6	194.4	194.4
2. Analytical Chemistry	100 (\$ 17.30)	106.9	106.9	106.9	106.9	106.9	106.9	106.9	115.6	115.6	115.6
3. Butane Propane News	100 (\$ 15.00)	100	100	100	100	100	100	100	100	100	100
4. Chemical Abstracts	100 (\$ 1007.00)	119.9	129.1	129.1	154.9	154.9	195.3	195.3	240.6	240.6	290.6
5. Chemical & Engineering News	100 (\$ 20.00)	100	100	100	100	100	100	100	105	105	105
6. Chemical Engineering	100 (\$ 25.00)	100	100	100	100	100	100	100	100	100	140
7. Chemical Engineering Progress	100 (\$ 27.00)	100	100	100	101.8	101.8	101.8	101.8	101.8	101.8	101.8
8. Chemical Week	100 (\$ 25.00)	100	100	100	100	100	100	100	100	100	120
9. Hydrocarbon Processing	100 (\$ 3.00)	166.7	166.7	200	200	200	200	250	333.3	400	400
10. Industrial & Engng Chemistry+	100 (\$ 19.5)	130.7	231.3	231.3	231.3	231.3	274.4	371.8	494.8	494.8	494.8
11. International Chemical Engng	100 (\$ 17.00)	100	188.2	188.2	747.1	747.1	747.1	747.1	747.1	747.1	747.1
12. Journal of Catalysis	100 (\$ 21.10)	109.5	200	200	305.2	335.5	458.8	458.8	553.5	610.4	667.3
13. Journal of Chemical and Engng Data	100 (\$ 19.50)	100	100	100	100	100	171.8	171.8	248.7	248.7	248.7
14. Journal of Organic Chemistry	100 (\$ 25.00)	100	114	140	140	142	148	182	264	264	264
15. Journal of Physical Chemistry	100 (\$ 24.00)	112.5	112.5	145.8	145.8	145.8	187.5	187.5	275	275	275
16. Journal of the American Chemical Society	100 (\$ 29.50)	100	100	119	120.3	120.3	167.8	174.6	244.1	244.1	244.1
TOTAL Relatives (ΣR)	1600	1746.2	2048.7	2160.3	2851.5	2922.6	3296.4	3484.6	4216.1	4341.5	4508.6
I. No. ($\frac{\Sigma R}{n}$)	100	109.1	128	135	178.2	182.7	206	217.8	263.5	271.3	281.8

Table 2

Price Relative (Base 1964 = 100)

Indian Journals	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
1. Chemical Age of India	100 (Rs 30.00)	100	100	100	133.3	133.3	133.3	133.3	166.6	166.6	266.7
2. Current Engineering Practice	100 (Rs 25.00)	100	100	100	100	100	100	100	100	100	100
3. Indian Chemical Engineering	100 (Rs 10.00)	100	100	100	160	160	500	500	500	500	500
4. J. of the Indian Chem. Society	100 (Rs 30.00)	133.3	133.3	133.3	133.3	133.3	200	200	200	333.3	333.3
5. Indian Journal of Chemistry	100 (Rs 15.00)	100	100	200	200	200	400	400	400	400	400
6. Indian Journal of Technology	100 (Rs 15.00)	100	100	200	200	200	200	200	200	200	200
7. Indian Journal of Biochemistry	100 (Rs 15.00)	100	100	200	200	200	200	200	200	200	200
8. Journal of Scientific and Industrial Res.	100 (Rs 15.00)	100	100	200	200	200	200	200	200	200	200
9. Science and Culture	100 (Rs 12.00)	100	100	125	125	200	200	200	200	200	200
10. Journal of the Instn of Chemists	100 (Rs 20.00)	100	100	100	125	150	150	150	150	150	150
11. Indian Chemical Manufacturer	100 (Rs 20.00)	100	100	150	150	150	150	150	200	200	250
Total Relatives (ΣR)	1100	1133.3	1133.3	1608.3	1726.6	1826.6	2433.3	2433.3	2516.6	2649.9	2800.00
Index No. ($\frac{\Sigma R}{n}$)	100	103	103	146.2	157.	166	221.2	221.2	228.8	240.9	254.5

Table 3

Price Relatives (Base 1964 = 100)

U.K. Journals	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
1. Analyst including Analytical Abstract and Proceedings	100 (8.40)	119	119	119	178.6	297.6	297.6	327.4	439.3	440.5	440.5
2. Chemical Engineering Science	100 (21.00)	114.3	147.6	147.6	164.3	171.3	190.5	200	228.6	228.6	228.6
3. Chemistry and Industry	100 (5.00)	120	120	140	170	170	170	240	240	360	360
4. European Chemical News	100 (4.00)	137.5	200	200	200	200	300	325	325	325	400
5. Journal of Applied Chemistry*	100 (15.00)	100	120	120	120	120	120	133.3	133.3	133.3	168.[illegible]
6. Journal of the Chemical Society+	100 (30.00)	100	153.3	153.3	153.3	216.7	216.7	333.[illegible]	556.7	556.7	693.3
7. British Chemical Engineering α	100 (2.50)	100	120	120	144	160	160	200	200	240	240
8. Tetrahedron	100 (40.00)	125	125	150	217.5	225	225	225	240	255	255
9. Transactions of the Institute of Chemical Engineers including Chemical Engineer	100 (7.00)	100	100	100	178.6	178.6	178.6	178.6	285.7	300	300
10. Chemical & Process Engineering β	100 (2.50)	120	120	160	160	160	160	160	400	400	400
11. New Scientist	100 (4.00)	100	100	100	100	100	125	125	150	212.5	243.8
Total Relatives ΣR	1100	1235.8	1424.9	1509.9	1786.3	1999.2	2143.4	2447.6	3198.6	3451.6	3729.9
Index Number ($\frac{\Sigma R}{n}$)	100	112.3	129.5	137.3	162.4	181.7	194.9	222.5	290.8	313.8	339.8

* Word 'Biotechnology' also added to this journal since 1971.

+ All sections

α Name changed as "Process Technology International" since Oct. 1972 and later merged with Chemical Processing since Dec. 1973.

β Name changed as "Process Engineering" since 1973.

Table 4

Utility Percentage (based on utility assessment slips of 1974)

Sl. No.	Name of the journal	Utility
1	2	3
	(A) American journals	
1.	A.I.Ch.E. Journal	42%
2.	Analytical Chemistry	100%
3.	Butane Propane News	25%
4.	Chemical Abstracts	100%
5.	Chemical & Engineering News	83%
6.	Chemical Engineering	75%
7.	Chemical Engineering Progress	75%
8.	Chemical Week	33%
9.	Hydrocarbon Processing	100%
10.	Industrial & Engineering Chemistry	100%
11.	International Chem. Eng.	75%
12.	Journal of Catalysis	100%
13.	J. of Chemical & Engng Data	100%
14.	J. of Organic Chemistry	71%
15.	J. of Physical Chemistry	85%
16.	J. of American Chemical Society	67%
	(B) Indian Journals	
1.	Chemical Age of India	100%
2.	Current Engineering Practice	25%
3.	Indian Chemical Engineer	100%
4.	J. of Ind. Chemical Society	58%
5.	Indian Journal of Chemistry	83%
6.	Indian Journal of Technology	100%
7.	Indian Journal of Biochemistry	Nil
8.	J. of Sc. & Industrial Res.	83%
9.	Science and Culture	Nil
10.	J. of the Instn of Chemists	50%
11.	Indian Chem. Manufacturer	80%
	(C) British Journals	
1.	Analyst including Analytical Abs. and Proceedings	75%
2.	Chemical Engng Science	88%
3.	Chemistry & Industry	33%
4.	European Chemical News	78%
5.	J. of Applied Chemistry	100%
6.	J. of the Chemical Society	57%
7.	British Chemical Engng	86%
8.	Tetrahedron	Nil
9.	Transactions of the Institute of Chemical Engineers including Chem. Engr	100%
10.	Chemical & Process Engng	83%
11.	New Scientist	100%

SHORT COMMUNICATION

EPISTEMODYNAMICS : A Theory of Organization of Knowledge

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A theoretical approach, Epistemodynamics, has been made to study the dynamics of growth and behaviour of today's n-dimensional, stochastically interdisciplinary knowledge, using the concepts of genetal systems theory [1] and vector analysis. A mathematical model has been constructed which has been found to increase the teleological capacity of man to organize knowledge in general and to furnish a practical methodology for the purpose of devising automatic classified information storage and retrieval systems.

Epistemodynamics proceeds by establishing that knowledge as a system truly conforms to the fourth level in the taxonomy of systems, that of a living system, as laid down by Hanika [2]. The system of knowledge then is shown to behave remarkably as an open system, that is the self-regulating or purposive systems, capable of attaining homeostasis in spite of import or export of energy by way of accepting or rejecting isolates into the system. In that the system of knowledge, termed as corpus of knowledge, existing within its environment, that is the Universe of Knowledge, has been proved to manifest the essential characteristics of open systems, namely, ingestion, excretion, metabolic exchange, goal-directedness, equifinality, differentiation and entropy. Here the corpus of knowledge, at any time, consists of finite, concrete and identifiable components, or the isolates, whereas the universe of knowledge consists of infinite, abstract and diffused components that are yet to be discovered by and imported into the corpus of knowledge.

It has been showed that the corpus of knowledge continually evolves certain equifinal states of knowledge, which may be termed as equifinal facets. These equifinal facets behave in a time-independent stable fashion and thus continue to point in a permanent semantic direction, while the numerous highly differentiated isolates of knowledge not only do they point in a specific semantic direction but also have the affinity to show a stochastic interdependence and interrelationship with several other facets and isolates. The system of isolates therefore forms a basis e_i in a space L of knowledge. The equifinal facets themselves constitute a system of vectors, the magnitudes of which can be specified by several semantically differentiated isolates, relative to the basis e_i. Such that the totality of facets F_J constitutes the system of knowledge K. Or,

$$K = f(F_j) \text{ where } F_j = \Sigma a_{ij} e_i \quad \ldots . (1)$$

This is the Epistemodynamic equation, and exhibits a time-independent steady state under external or internal influences causing new semantic interdependence and syntactic interrelationships.

By way of testing the model, for example, for generating a classified index of interdisciplinary micro documents, the vector F was subjected to a typical linear transformation as follows:

$$D = AF \quad \ldots . . (2)$$ where

$A = [a_{ij}]$, is a square matrix, with scalar elements, that is the coefficients of vector F and therefore processable by computers with great facility. Here the D is the document index vector and F is the document surrogate vector.

A number of alternative algorithms are being developed and tested to process the transformation matrix A.

The Epistemodynamics while providing a definite methodology to process information for automatic classified indexing, effectively solves some of the perennial and irksome problems in meticulous mapping of knowledge in the conventional tree structure, by eliminating the need to produce a classified schedule, beyond an array of equifinal facets; the necessary prerequisite of a notation scheme for the classified schedule; the use of syntactical formulae or formats; and the use of any connecting symbols.

References

[1] Hanika, F, De P. New Thinking in Management - A guide for Managers. Hutchinson, London, 1966.

[2] Bertalanffy L. Von. General Systems Theory. Human Biology, 1951.

LETTER TO EDITOR

Recently, Krishnaswamy [1] has used Fortran IV language for information retrieval. Regarding this short communication several comments seem to be in order.

1. It is a heavy and unwarranted price in terms of processing time for the simple error of leaving some blanks in the input author query or for accessing the second or third etc, author in the author list. This however is not without a premium of noise (according to the author this is not a drawback) resulting from the retrieval of a lot of junk information in cases where any four letters of the split author query are the same as the one in the author list. Obvious examples of this would arise when the complete author list contains author names like 'KRISHNASWAMY' and 'KRISHNAVENI' or 'HOFFMANN' and 'RIEMANN'.

There are many other efficient data organisation techniques - the indexed sequential organisation or the organisation of bibliographic records similar to the MARC-II format - that require NO splitting of the author's name.

2. The author has confused between the auxiliary storage which he might be using for storing temporary data sets with the virtual storage (VS). The author has made a naive and misleading statement that because the compilation of the author query is needed only temporarily hence a VS in IBM 370/155 was used. Actually VS has nothing to do with temporal characteristics and needs for its implementation the 'dynamic address-translation' facility for swapping the 'pages' between the main storage and an external medium such as a direct-access storage device for efficient and effective utilization of main storage.

3. The program logic, as depicted in Fig. 1 (Ref. 1) is such that if the input query starts anywhere after four columns (which is allowed by the so-called 'latitude') but before the seventh column, no output will be triggered even if the query author IS contained in the complete author list because of the implementation of the precaution number 1 mentioned by the author.

4. There is no explicit difference between the first two precautions mentioned in the paper. The third one is vague. The author has not shown in the flow chart as to now exactly is this precaution implemented, whereas he has shown the implementation of a precaution which is not discussed in the text. The author has unwittingly used the blank card for denoting the end of a data set, however the use of END parameter in the sequential READ statement would have been convenient and time-saving.

5. Lastly, the method described is not a general one and is true only if the programming language adopted is Fortran. But Fortran is not suitable for information retrieval applications. Either a versatile language like PL/1 or a low level language like Assembly or some other suitable variant of these should be used for efficient search and data organisation.

S. Srinivasan, II M.S. Computer Science,
I.I.T., Madras and

M.L. Sharma, R.R.C., Kalpakkam

[1] KRISHNASWAMY, R. Information retrieval using split query author and virtual storage (Short communication): Ann Lib Sc Doc. 1975, 22(3), 135-38.

FOCUS ON UNISIST PROGRAMMES

This is the eighth instalment of this Feature. In the last two issues of the Annals it was not possible to accommodate this Feature as those issues were of a special nature. Hence, in this instalment, we are trying to cover most of the important news items from the vol. 3 of the Unisist Newsletter. - Ed.

UNISIST PROGRAMME AND BUDGET FOR 1975/76

The eighteenth session of the General Conference of Unesco approved the Unisist Programme and Budget for 1975-76. As in the previous biennium, all activities are divided into five programme objectives:

1. Improving tools of systems interconnexion

Activities within this section will concentrate on ways and means of developing compatibility between information systems. It is foreseen in this biennium that the Broad System of Ordering (BSO), serving as a switching mechanism between different classification schemes and thesauri, will be finalized and widely distributed.

2. Improving of information transfer

Special attention will be paid to the establishment of a global data referral service in science and technology, a pilot data referral centre will be launched in co-operation with appropriate organizations and interested Member States.

3. Training of specialized manpower

The Handbook on Information Systems and Services will be published. Several regional seminars and training courses will be organized, including two regional training courses for administrators and managers of information systems and services and a seminar on indexing techniques for participants from developing countries.

The establishment of training centres for information specialists in Member States will be encouraged. Support will be given for training users in the effective application of scientific and technical information. The Manual for the Education and Training of Users will be tested and published in 1976.

4. Development of scientific information policies and structures

The continuation of regional meetings in the field of information policies will be maintained. Studies, surveys and management reviews of main problem areas, such as legal and economic aspects of information transfer, at the national and international levels will be published.

5. Assistance to Member States in the development of scientific and technical information infrastructure

Assistance in the form of short-term expert and staff missions will be provided to Member States, upon request, for the strengthening of national and regional scientific and technical information and documentation infrastructures, for advising on the design and establishment of national and regional information services and networks in science and technology, and for the training of information manpower.

The total Approved Budget for 1975-76 is composed as follows:

Regular Programme	..	$ 1552 800
UNDP	..	$ 850 000
Others	..	$ 60 000
Total	..	$ 2462 800

UNISIST INFORMATION CENTRE ON BIBLIOGRAPHIC DESCRIPTIONS

A Unisist Information Centre on Bibliographic Descriptions to maintain and update the UNISIST Reference Manual for Machine-Readable Bibliographic Descriptions is being created and will be located in, and partially funded by, The British Library and will form an integrated part thereof. It will operate for an initial period of three years.

The objectives of the Centre would be: to maintain the Reference Manual and to issue amendments; to co-ordinate activity within the field of bibliographic descriptions; to promote the use of the Reference Manual and to stimulate an awareness of its value; to make provision for suitable education and training in the use of the Manual; and to co-operate with other agencies of Unisist and with other bodies of similar concern, such as the IFLA UBC Office.

BROAD SYSTEM OF ORDERING

Following the comments of the Unisist Advisory Committee, the SRC (Subject-Field Reference Code) Working Group saw as the primary task the compilation of a structured or classified list of 'candidate subject-fields' for the SRC. After six months of work, two alternative SRC schemes were developed, reflecting two points of view within the FID Working Group. The two schemes have now been merged and revised by a three-man BSO editing/drafting panel (E J Coates, D. Simandl and G.A. Lloyd).

The new scheme contains some 2000 subject-fields in a structured arrangement at a minimum of two levels. It has approximately 670 subject-fields for Physical Sciences and Life Sciences including Agriculture and Medicine; 530 subject-fields for Technology; and 700-800 subject-fields for Social/Behavioral Sciences, Humanities and the Arts. Notation has not yet been applied, in accordance with the recommendation of the Unisist experts, who felt that too early an application of notation would unjustifiably influence the structure of the BSO.

The scheme is now ready for testing. The tests will take the form of field trials in which BSO will be used to tag samples of materials from such compilations as: the FID/NFAIS World Inventory of Abstracting and Indexing Services; indexes to machine-readable data base; and national directories of information sources.

It is hoped that information will be obtained from these trials on - completeness of coverage of BSO and appropriateness of depth for the intended purposes of BSO.

ISDS BULLETIN PUBLISHED

The International Centre of the International Serials Data System (ISDS) has announced the publication of the ISDS Bulletin. Its purpose is to list serial titles recently recorded by ISDS Centres. The printed records contain the essential ISDS data elements: ISSN; key-title and parallel titles; publisher; place of publication; country code; start date; abbreviated title; links.

The records are listed in ISSN order. Key titles and variant titles are listed in the alphabetical title index. Both forms of title refer to the ISSN of the record. The Bulletin will also list amendments and corrections of serial records previously published, as well as cancelled ISSN. It will appear on a bi-monthly basis and will be cumulated yearly.

THE SECOND SESSION OF THE UNISIST ADVISORY COMMITTEE, Paris, 5-9 May 1975

The Advisory Committee elected Professor A. Neelameghan (India) as Chairman, Mr. G. Fernandez de la Garza (Mexico) as Vice-Chairman and Dr. M. Day (U.S.A.) as Rapporteur.

The Committee discussed the current and' proposed projects of the Unisist programme, such as: extension of the programme to social science information (proposed); periodic review of trends and requirements in scientific and technical information (proposed); the Broad System of Ordering; a feasibility study on an International Standards Information Network; a study on the design of a world referral network for science and technology; Unisist policy and programme in training specialized manpower; a feasibility study for an international clearing system on training programmes in the field of information; the Unisist programme for development of regional information policies; a study on financial, socio-economic and administrative aspects of information policy; a long-term policy research programme making use of scientific and technological information statistics (proposed); on-going Unisist pilot projects; Unesco/UNDP projects administered by Unisist in developing countries and recently completed Unisist Guidelines.

The Advisory Committee endorsed the on-going projects and encouraged the Secretariat to proceed with the proposed activities. The inclusion of social science information programmes within Unisist was considered as especially appropriate given the problems facing information systems in this field.

THE SECOND SESSION OF THE UNISIST STEERING COMMITTEE, Paris, 13-17 October 1975

The Agenda included an examination of the current Unisist Programme and of the objectives and priorities for the future programme. Attending the session were delegations from Argentina, Belgium, the People's Republic of China, Ethiopia, France, Federal Republic of Germany, Ghana, India Japan, Peru, Sweden, Tanzania, Tunisia, USSR, United Kingdom, United States of America, Yugoslavia, the statutory representative of the International Council of Scientific Unions (ICSU), an observer from the Democratic Republic of Germany as well as representatives from IAEA, OAS, WHO and WIPO.

Mrs. I. Wesley-Tanaskovic (Yugoslavia), Chairman of the Steering Committee, presented a report on the activities of the Bureau and Professor A. Neelameghan (India), Chairman of the Unisist Advisory Committee, informed on the second session of this Committee.

1. Inclusion of Social Sciences in the Unisist Programme

All delegates reaffirmed their support for the inclusion of the social sciences within Unisist and generally felt that the special problems associated with the social sciences did not present a restriction to incorporation but rather a challenge to be gradually overcome by social science specialists with time and experience. The Steering Committee endorsed the establishment of an Ad hoc Committee to advise the social sciences programme on its information activities and delegated to its Bureau the responsibility to advise on the membership and terms of reference of this committee and to assist in the organization of its work.

2. International Standards Information Network

The Committee endorsed the activity of Unisist in supporting a feasibility study for such a network, performed by ISO. Any continuing support from Unisist funds would be limited to assuring systematic coverage of information standards.

3. Terminology Activities

Unisist is providing a small subsidy for the publications of the Clearinghouse of IINTE in Poland in its work on a bibliography of thesauri. The INFOTERM Centre in Vienna on the other hand, is seeking with the help of Unisist to create a worldwide network of co-operating terminology centres and is providing a bibliography on standard terminology. The Steering Committee agreed that the current programme should be fully evaluated and the results submitted in a report to the Bureau for a decision on the priority to be accorded to terminology activities in the future Unisist Programme.

4. Development of Manpower Resources

The Committee approved the plan to hold the second meeting of the Ad hoc Committee on Education and Training in May 1976. The agenda for this meeting will include an examination of evaluation reports on training activities; detailed discussion on the purposes of the education and training programme; development of a revised and simplified plan for a registry and clearing scheme on education and training programmes; and a proposal for setting up an inter-agency fellowships fund.

5. Activities in Information Policy

The Committee noted with satisfaction the growth of national focal points and emphasis on regional activities such as the first Unisist Conference on Regional Policy in South and Central Asia. The Secretariat explained that developing countries should not be asked to disperse their limited resources by establishing many national structures or focal points, but that the Unisist Programme should be adapted to work with existing focal points and to assist them in their development. The first international meeting of managers of information systems and services is scheduled for Yugoslavia in April 1976 with a second to follow the next year in the Federal Republic of Germany. Concerning the conceptual aspects of the policy programme, the Secretariat noted that the results of studies on the economic and financial aspects of information policy would soon be available and that a modest programme on statistical indicators could soon be initiated.

6. Projects for Developing Countries

The Committee endorsed the report presented by the Secretariat on this activity, which ranges from pilot projects and advisory services under the Unesco regular budget to UNISIST executive services for some 15 national and regional projects financed under the United Nations Development Programme. It was explained that projects are designed to match the capabilities of the host countries, and that information techniques in countries which did not have the capacity to benefit from these techniques. The Steering Committee especially endorsed the proposed study on how information systems in developing countries contribute to the transfer and application of information.

7. Data Handling and Dissemination

The Committee endorsed the progress achieved so far in this field in collaboration with ICSU/CODATA; this co-operation was seen as a model for future co-operation between Unisist and non-governmental organizations. Completed achievements in this programme include studies on the accessibility and dissemination of data, the feasibility of a World Data Referral Centre and the relationship between secondary information services and data services, as well as a guide to the presentation of numerical data in the primary literature and a symposium on man-machine communications in scientific data handling. There was general support for the creation of a World Data Referral Centre, which would serve mainly to co-ordinate a network of national centres. Contributions will be sought from Member States, ICSU and other organizations, to be combined with UNISIST funds to launch this project.

8. Examination of the Objectives for the Future Unisist Programme

In introducing the proposed orientation for Unisist in the short term (1977-1978) and the medium term (1977-1982), Mr. Wysocki explained that the original five Unisist objectives had been recombined to yield four objectives, valid for the entire Unesco general information programme, and designed to promote:

1. Formulation of information policies and plan;
2. Establishment and application of methods, norms and standards;
3. Development of information infrastructures;
4. Training and education of professionals and users.

The third objective resulted from the combination of those covering development of national networks and improvement of the institutional components of the information transfer chain. Although none of the new objectives deals uniquely with problems of developing countries, these are to be given special consideration in all aspects of the future Unisist Programme.

The Steering Committee supported all four objectives and agreed that training and education activities and the development of information infrastructure should continue to be accorded high priority in the short and medium terms.

BOOK REVIEWS

Dudley, Edward, ed. S.R. Ranganathan 1892-1972: Papers given at a Memorial Meeting on Thursday, 25th January, 1973. London, The Library Association, 1974. [Reviewed by P B Mangla]

Ranganathan was really a great genius in librarianship. A mathematician-turned-librarian during the early 1920s,he remained a true devotee of his new vocation for five decades and died at 80 while still actively engaged in research. From the very beginning of his professional career he committed himself to work in this profession like a true karmayogi and made original contributions which are already very well known throughout the world. His writings comprising more than 60 books and a few thousand research articles deal with the whole of library science field. Outside India however he is better known because of his Colon Classification (1st ed. 1933) and writings on classification theory and indexing.

In his approach to library problems he was always much ahead of his age, and considering from several aspects, the period of twenty five years (1948-72) when he came to be known prominently at the international plane, can undoubtedly be called an 'age of Ranganathan'. His writings permeate with seminal ideas of an intellectual giant which would greatly inspire and guide the future generations in their research work. Some of his writings such as Five Laws of Library Science (1st ed. 1931) and Prolegomena to Library Classification (1st ed. 1937) can rightly be called as 'classics' in Library Science.

In developing different theories, techniques and practices Ranganathan always insisted on giving them a scientific basis so that librarianship did not continue to be based on mere empiricism. His Five Laws, for example, most aptly summarise the role and functions of libraries as social institutions. In library classification and cataloguing as well, his canons provide a conceptual framework which facilitates the application of scientific method for further study and research.

His contributions were well recognised during his life-time itself and he was recipient of many honours in India as well as outside The Government of India, for example, honoured him by awarding a Padmashree in 1957 and later on in 1965, by designating him as a National Research Professor of Library Science. Not more than half a dozen academicians have been given the latter honour in India till now. Outside India, Pittsburgh University awarded him a D. Litt. degree in 1964 and in 1970 he received the Margaret Mann Citation in Cataloguing and Classification from the American Library Association. Throughout his professional career he remained very actively associated with library associations and other organisations at the national and international levels.

In this background it was quite natural therefore that the Library Association, London, of which he was an Honorary Fellow and a Vice-President, held a memorial meeting in 1973 and this small volume contains six papers presented by some of Ranganathan's friends and admirers at this meeting. The six contributors are B.C. Vickery, A.J. Wells, B.I. Palmer, D.J. Foskett, H. Coblans and D.W. Langridge, and their writings deal with the different aspects of Ranganathan's life and contributions. S.R. Ranganathan: A Chronology has been compiled by Kate Wood in this volume. The Library Association decided to publish this volume as a 'small measure of recognition of one of the outstanding influences on professional thinking in this country' (foreword).

Among the contributors, Palmer was first to come in contact with Ranganathan during the World War II when the British Royal Force work brought him at a camp in the environs of Madras. In his paper 'Ranganathan as a Person' Palmer writes about the various aspects of Ranganathan's life: personal as well as professional. To quote: "Asked if he did not tire of librarianship, he (Ranganathan) declared that a man needed three opportunities from life: to earn a living, to do creative work and to have recreation; "happy the man", he said "who can find all three in the same activity. What need for outside distractions?" Vickery writes about Ranganathan's Contributions to Indexing and concludes: "In looking back over his work, there are times when one fears that Ranganathan's passion for intellectual analysis may have led him to scholasticism. But at bottom his vision was intensely practical . . . For Ranganathan an index was nothing if it did not reveal all these riches of the mind to every reader". Wells writes about Ranganathan's influence on bibliographical services and points out that this influence was not limited to the BNB and the Indian National Bibliography but was extended to the national bibliographies produced in countries such as Ceylon, Singapore, Malayasia and Canada. While mentioning the new experiments in the preparation of the BNB he concludes: "The end result of this re-evaluation may produce a system which looks very different from the work now going on in Bangalore (India), but without that work and without the single-minded devotion of Ranganathan himself, I doubt whether it would have been possible at all". In his paper Ranganathan's Professionalism, Foskett writes about Ranganathan's involvement in his professional pursuits and says that Ranganathan 'delighted in his profession as a contribution to humanity'. Coblans writes about Ranganathan at the international level and says that "for many of his friends he became what I would like to call a 'conscience' for the West--a sort of salutary irritant of our subconscious feelings of superiority-- . . . And, above all, he continually questioned the crude assumptions that we have about the needs of under-developed countries". Langridge writes about Ranganathan's interest in mysticism. In spite of his being a great intellectual, Ranganathan was basically a South Indian Brahmin and had keen interest in mysticism, occult phenomenon, astrology and in the study of relationship between intuition and intellect. But at the same time, to quote Langridge, "Much as he appreciated the significance of mysticism, Ranganathan was not himself a mystic. He was an intellectual who absorbed much from the West and outdid us all in the application of scientific method to librarianship. Religious beliefs and ideas are not as apparent in his works as one might expect, though he does quote effectively from sacred writings. He was obviously a man well versed in the Hindu classics". In his next birth whether he would be a library thinker or a saint is an interesting topic for the mystics to dwell upon. Katewood's chronology gives a glimpse of some of Ranganathan's achievements and activities during his life time.

Although there are already numerous other writings on and about Ranganathan, this small volume can still be considered as an important and timely contribution by the Library Association, London, in the memory of this great man. Ranganathan always had a tremendous interest in British librarianship and he maintained regular contacts with many British librarians. These six papers in this small volume are in a way an attempt to "assess our corporate indebtedness to one whose simple but brilliant analysis, based upon an almost alient philosophy, penetrated problems which defied earlier solution, and who helped to create a deeper appreciation of the international significance of our work". (foreword).

PRECIS, a manual of concept analysis and subject indexing by Derek Austin. London, the Council of the British National Bibliography Ltd., 1974. x, 551p. ISBN 0-900220-42-2 £ 7.00. [Reviewed by T.N. Rajan].

A notable and significant development in the area of subject indexing in the 1970s has been the introduction of Preserved Context Subject Index (PRECIS) in the British National Bibliography (BNB) for the preparation and production of its subject index, replacing the technique of chain indexing which had been in use for almost two decades. In 1971, BNB had developed the Machine Readable Catalogue (MARC) system in the United Kingdom and had started using the computer for the production of BNB. PRECIS was developed as a means for producing the printed subject index from data held on machine-readable files. Although PRECIS was viewed with some scepticism in the beginning, it has now established itself as an accepted method of subject indexing. Besides BNB, the Australian National Bibliography, the British National Film Catalogue and a few other printed bibliographies are now making use of PRECIS.

The book under review is a manual on PRECIS by Derek Austin who has been the principal architect of the system. The manual is aimed to be a reference tool for the more experienced indexer, wherein can be found a detailed analysis of more complex problems of subject indexing together with sufficient theory, in addition to detailed descriptions of standard routines and procedures for indexing. In a succinct foreword, Wells, the editor of BNB, sets out the reasons for switching over to the new system from 'chain index' while acknowledging that PRECIS has evolved out of Chain Procedure.

The principal features of PRECIS are the methods of formation of the string consisting of elements that together express the subject contents of a document and the automatic manipulation of entries by the computer. While the string formation is essentially the product of human intellectual effort, the computer's main task is to reduce clerical drudgery and attendant risk of errors. The string forming operations are backed up by a set of procedures for syntactic controls and for establishing semantic relationships between concepts. All the elements of the syntax are embodied in a scheme of 'Role operators' which regulate the formation of the input string. One of these role operating codes is prefixed to each term in the string which represent in a summary form, the subject contents of the document. The position of the elements in the string is determined by the ordinal value of the role operating code, which also indicate the function of the indexed term. The result of these operations produces coextensive index entries under each one of the elements chosen to lead the entry. The role operating codes do not, however, feature in the actual entries. Each one of the entries preserves the full context of the selected terms of the entry. The semantic aspects of PRECIS are taken care of by a set of procedures for making See and See also entries for terms that do not form part of the string but might be approach points. A thesaurus of terms is used for the purpose of ensuring consistency and providing for a semantic network of terms. The thesaurus of terms is used for the purpose of ensuring consistency and providing for a semantic network of terms. The thesaurus is 'open ended', in the sense, that new terms are admitted at any time they are encountered in the literature.

The theoretical basis of the system as well as the operating procedures and methods are described in great detail in the manual. The theoretical approach of PRECIS had its roots in the efforts of the Classification Research Group (CRG) to design a general classification system in the sixties to cope with the pressing needs for proper subject representation of contents of documents and also its suitability for computer applications. With the results obtained by CRG for achieving a prescribed citation order in a freely faceted classification scheme, the order of citing terms according to the principle of "context dependency" was hit upon, in which one term sets the next term into meaningful context, regardless of their relative importance as collocating factors. This has a close resemblance to the ways in which sentences are formed in a natural language. The passive form of sentences has been favoured for representing the order of role indicators in PRECIS. The entries that are formed from the string are presented in a two-line format, each one of the entries preserving the logic of context dependency.

After explaining the theoretical premises of PRECIS in the first few chapters, its syntax and the techniques of string formation using the role operators are dealt with in great detail in the succeeding twenty chapters. The role operators which form the back bone of PRECIS, are considered in three groups viz., Main line operators (0-6), Interposed operators (p-t, g), and Differencing operators (h-d). The Main line operators identify the basic components of a compound subject and also regulate the order in which these components should be written. The Interposed operators are inserted operators at various, increasing the specificity of a string. They, however, cannot start a string. The Differencing operators have semantic rather than syntactic functions and are used to those parts of a compound term which limit the connotation of the focus without prescribing either its syntactical role and its position in the string.

The treatment of compound terms and the technique of differencing are particularly interesting. In fact, this has been one of the oldest problems of alphabetical subject indexing still needing neat solutions. Looking at the problem afresh, Austin has thoroughly examined varieties of compound terms and has offered fairly satisfactory solutions.

The identification of terms as main line or interposed operators is largely interpretative and might lead to differences among indexers. However, with numerous examples, Austin has tried to introduce a systematic approach to string formation and thereby reduce possible differences and inconsistencies in handling these operators.

The semantic aspects of PRECIS are dealt with in detail in five chapters. Each term in the string which are marked as a lead is considered out of its context and as an entity in its own right and semantically related terms such as synonyms, antonyms, superordinate and associative terms are established. In this way, a network of semantically related terms are formed and See and See also reference entries are generated. The procedure for generating these cross reference entries from data held by machine-readable files are explained at length.

The rest of the chapters are devoted to automatic construction of feature headings, management aspects of PRECIS and problems requiring further investigation. Throughout the text, a number of examples are worked out to illustrate the ideas delineated. In addition, series of exercises are set at different intervals of the text, to help the learners to test their progress of learning with the answers provided at the end.

The appendix contains flow diagrams of basic indexing decisions, algorithms for entry construction and feature headings, automatic data processing aspects of PRECIS, examples of PRECIS entries in Dutch, French, German, Spanish, Chinese, Finnish, Norwegian, Sinhala and Swedish demonstrating the potential of PRECIS as a multilingual system. Two indexes are given, one covering the examples used in the text and the other for the text matter itself for which the same system has been used, again illustrating the feasibility of PRECIS as a system for book indexing.

The book has been brought out very well and is reasonably priced.

To sum up, the PRECIS manual is one of the most valuable publications on subject indexing. Not only does it serve as an excellent manual for learning and using the system methodically, it is useful as a general book on subject indexing also.

The Anatomy of Censorship by Jay E. Daily, New York, Marcel Dekker, Inc. 1973. xv+403 p. (Books in Library and Information Science, 6) ISBN 0-8247-6065-4 [Reviewed by Surendar Mohan]

Censorship of sexual subjects in the 19th century had limited or affected expression of serious literary, artistic, political and scientific ideas. Censorship is said to be both contagious and highly profitable. If one considers freedom of choice important, one will certainly find 'The Anatomy of Censorship' by Jay. E. Daily, a fascinating and significant book. It is notable not only for its scholarship, reflecting ten years' intensive research but also for its frankness. Pornography, political repression, and many others are discussed in depth. The accent is mainly on sex. The Anatomy of Censorship will be a useful guide for readers from all walks of life and educational backgrounds.

Dr. Daily not only reveals such information that the Federal Government has indeed had official book burnings, but braves the opinions of those who hunt most to reach certain startling conclusions. Do most waves of censorship occur at a time when official corruption is made public? Is there any relationship between the Supreme Court decision on censorship and the Watergate affair? And what will the price of the new Puritanism be to one and one's family? After all, there is no such thing as a little censorship. Answers to these questions can be found in this book.

The jacket of the book is revealing. The book is divided into two parts with mystifying, allegorical headings - Part 1 - 'The Pathetic Agony' Part II 'Harlotry and Heresy'. The chapter headings of each part are equally mystifying in their allegory. However, the scope of the book is worldwide though necessarily centered on the United States. Because those who publish or distribute "obscene" materials are liable to criminal proceedings and punishment, librarians are imperilled along with other professionals who work in mass communications in the United States. Librarians are asked to use this book as it helps in their necessary battle for intellectual freedom, aided, it is hoped, by all who use libraries and agree. When a librarian builds a collection he has no moral values of his own, no politics and no religions as far as the building of the library collection goes; he is bound solely to serve the interests of his community, hopefully in broadening them, but always in respecting them. The difference between selection and censorship is ~~even~~ more difficult. Library schools should include studies in the field of censorship in order to educate professionals who know how to deal with censored literature.

Thirty-four pages of references and quotations have been cited at the end of the publication which add to the value of the book. The get-up of the book is excellent and the glossy paper adds to its aesthetic appeal.

27 OCT [illegible]

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VOL 23 NO 2 JUNE 1976

contents

Pages

GUHA (B), SEN (B K), NEOGI (R N)

On Change of Titles of Periodicals, Pt 3 157-68

RAJAGOPALAN (T S)

Towards Evolution of a National Information System for Science and Technology in India 169-72

RAHAT HASAN

Reprographic Services in Delhi Libraries 173-78

RAIZADA (A S), DEVADASSON (F J)

CHEM/SDI Service of CAN/SDI Software 179-88

KUMAR (D)

A Decade of Rising Subscription Rates of Indian, British and U.S. Chemical Journals - a Preliminary Analysis 189-94

SHORT COMMUNICATION

Epistemodynamics, by S. Sirajul Husain 195

LETTER TO EDITOR 196

FOCUS ON UNISIST PROGRAMMES 197-200

BOOK REVIEWS 201-204

270

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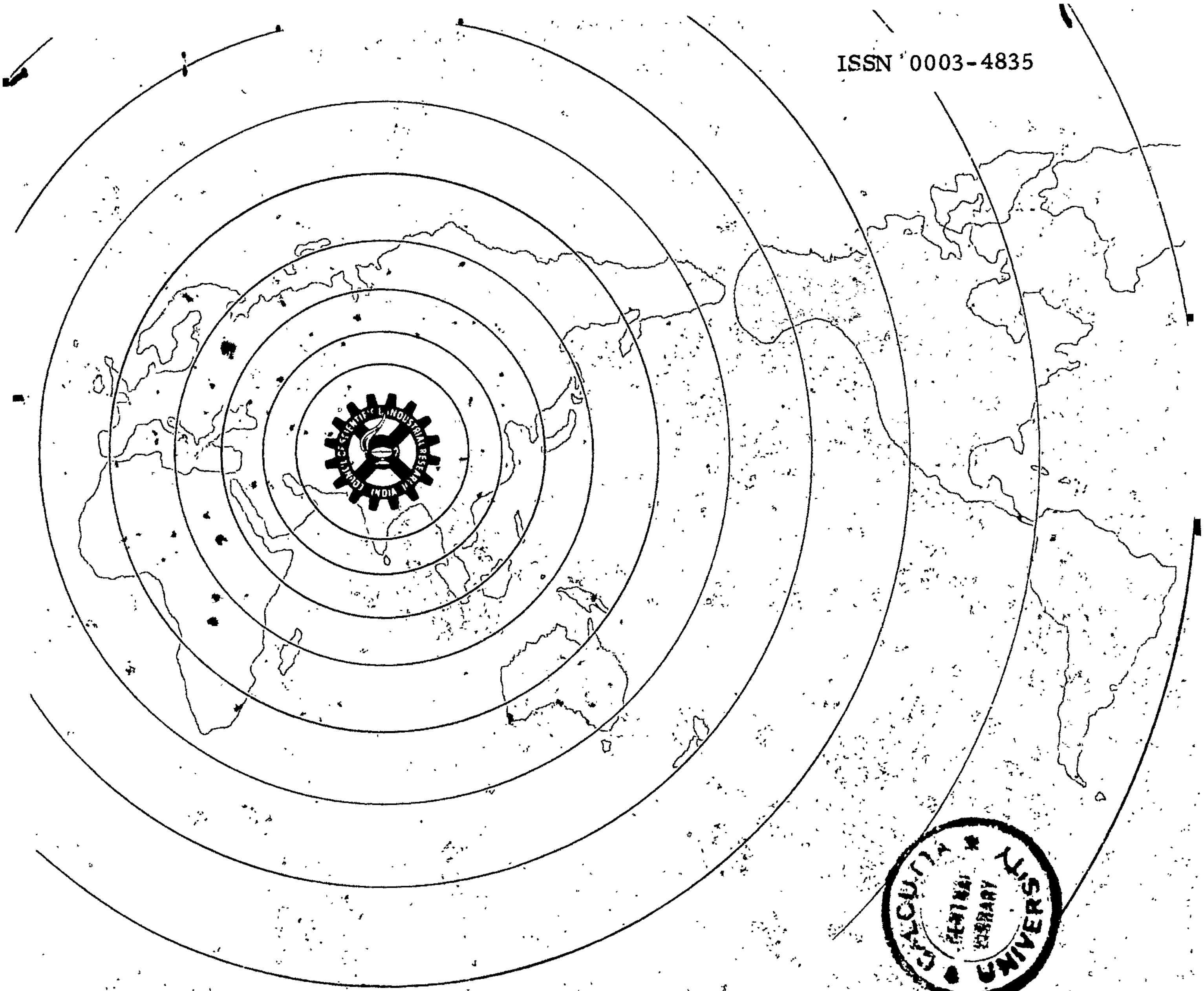

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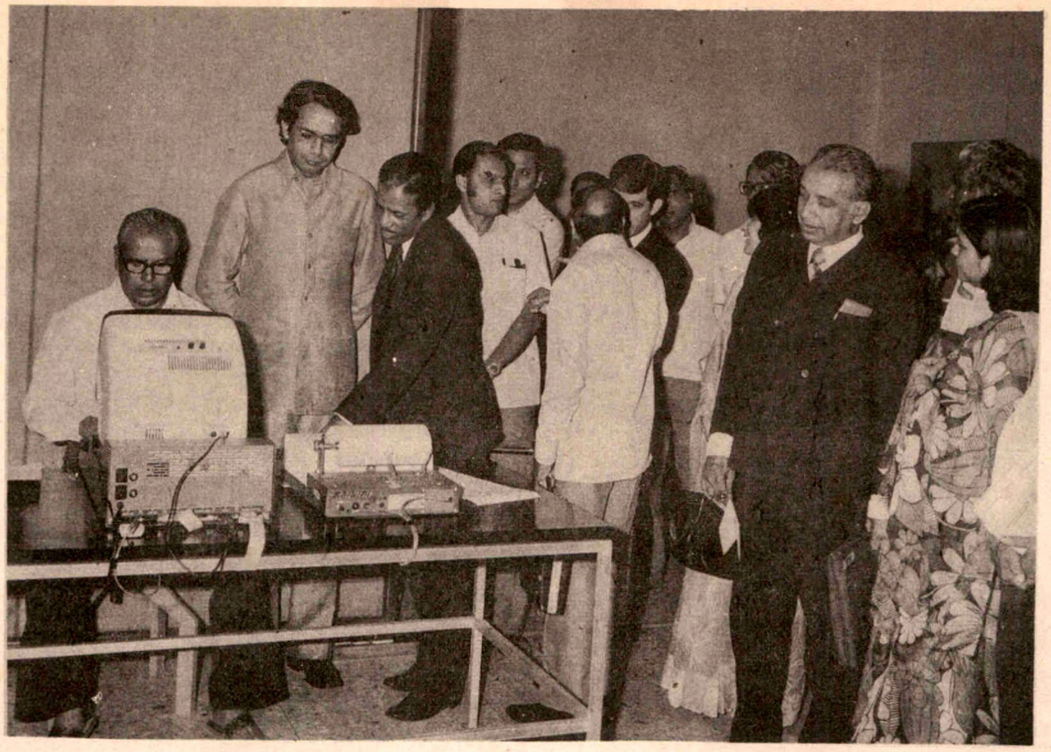

Shri V.C. Shukla and Dr. A. Ramachandran among others at the ESRIN/RECON Demonstration at TIFR. Shri A.S. Raizada is at the terminal.

ACCESS TO WORLD BIBLIOGRAPHIC DATA BASES AND ESRIN/RECON ON-LINE DEMONSTRATION IN INDIA

S K Kumar
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Library and Information Services,
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The ESRIN/RECON on-line long distance demonstration during 20-25 September 1976 at Bombay will surely be considered an important event in the history of documentation services in India. The Demonstration was preceded by a Seminar on Access to World Bibliographic Data Bases on 18 September. Mr S K Kumar and Dr V A Kamath present in the accompanying communication a report of the Seminar and the Demonstration for the benefit of our readers. The Editorial Committee records its grateful acknowledgement to the authors of this report, which, we are sure, will be appreciated by our readers. —Ed.

1. INTRODUCTION

A number of computer-readable bibliographic data bases with international coverage and scope are presently being brought out by foreign commercial agencies, government departments, professional bodies, and scientific and technical institutions. Some of the popular data bases in the field of science and technology are: CA CONDENSATES for chemistry and chemical technology, BA PREVIEWS for biological sciences, COMPENDEX for engineering, INSPEC for physics, electrotechnology, computer and control, MEDLARS for medical sciences, INIS for nuclear sciences, NASA for aerospace sciences, AGRIS for agricultural sciences and technology and SCI (Science Citation Index). The advent of computers in the information field has made possible not only the creation of such data bases but also efficient and fast access to world sources of scientific and technical information for purposes of current awareness service as well as retrospective literature search.

A beginning has been made recently in India to develop computer-based SDI service. An experimental project using CAN/SDI software and with CA CONDENSATES data base is being carried out at IIT. Madras. This project is being supported by UNESCO/UNISIST, Paris. The successful outcome of the project will enable systematic organisation of computer-based SDI service, using several of the available machine-readable bibliographic data bases for the benefit of a large number of users of scientific and technical information.

2. THE SEMINAR ON ACCESS TO BIBLIOGRAPHIC DATA BASES

A one-day seminar on "Access to Bibliographic Data Bases" was organised on 18th September 1976 as a prelude to the RECON On-line Demonstration for familiarising the users, namely, scientists, technologists, engineers, doctors, information scientists, and librarians with the existence and use of machine-readable bibliographic data bases.

The Seminar was held in the Homi Bhabha Auditorium of the Tata Institute of Fundamental Research, Bombay. It was sponsored by the Department of Science and Technology and organised by BARC, DRTC and INSDOC.

About 300 scientists, technologists, information scientists and librarians working in various R&D establishments, academic institutions, government departments and industries, attended the seminar. Participants were also invited to witness the ESRIN/RECON On-line Demonstration which was held during 20-25 September, 1976.

2.1 CONDUCT OF THE SEMINAR

During the Seminar, six invited papers were presented in the two sessions and discussed as per the details given below:

Technical Session (Morning):

Chairman - Prof. A. Neelameghan

Papers presented:

1. Modern Trends in Information Processing - by S. Parthasarathy (INSDOC, New Delhi)
2. Machine-Readable Bibliographic Data Bases by T.S. Rajagopalan (INSDOC, New Delhi)
3. International Nuclear Information System (INIS): Accessibility and Utility of its Bibliographic Data Base - by N.M. Malwad (L & IS, BARC, Bombay).

Technical Session (Afternoon):

Chairman - Dr V.A. Kamath

Papers presented:

1. MEDLINE - by A. Neelameghan (DRTC, Bangalore)
2. The CHEM/SDI Project - by A.S. Raizada (INSDOC, New Delhi)
3. Machine-Readable Bibliographic Data Bases with Special Reference to the Experience of India in Participating in AGRIS System - by P.C. Bose (ICAR, New Delhi).

Morning session of the seminar started with the paper entitled "Modern Trends in Information Processing" by Shri S. Parthasarathy, Scientist-in-Charge, INSDOC, New Delhi. He stated that during the last ten years, there has been a growing tendency to introduce automation in the field of information processing. The rapid developments in the fields of computer technology, telecommunication, including satellite communication, reprography, photocomposition, etc. are now gradually making an impact on information processing. It is estimated that there are now about 200 computerised data bases available. Some of the centres providing on-line information services are LOCKHEED DIALOG, Systems Development Corporation, National Library of Medicine, and ESRIN, Frascati. He further mentioned that considerable work is going on to develop adequate telecommunication networks for data transmission. TYMSHARE, ARPANET, CYCLADES and EURONET are some of the networks.

Shri T.S. Rajagopalan, in his paper entitled "Machine-Readable Bibliographic Data Bases", presented a general account of these data bases and their use in information service. He pointed out that the machine-readable bibliographic data bases have some additional advantages over their corresponding printed versions. Much before the release of printed version of abstracting and indexing services, their magnetic tapes are available for mailing. This means that users can have access to information more speedily with the machine-readable data bases. It is also stated that in some data base services, the retrieval efficiency is sought to be improved by means of greater depth of indexing than in the printed version. He mentioned that because of high costs of data bases and computer processing, our country cannot afford duplication of efforts in terms of multiple organisations processing the same data bases. In our country, he said, much depends upon the progress that would be made in the fields of telecommunication and computer hardware.

The last paper of the morning session was entitled "International Nuclear Information System (INIS): Accessibility and Utility of its Bibliographic Data Base", by Shri N.M. Malwad. He mentioned that the INIS is the most authoritative and comprehensive information system in the field of nuclear science and technology. Its bibliographic data base follows a number of international standards for its content and structure, making it compatible and acceptable by national information centres in the world to provide a wide range of information services. INIS bibliographic data base can conveniently be incorporated into any existing national or international information network. He described the potentialities of the INIS bibliographic data base with regard to its accessibility and utility.

The afternoon session of the seminar started with the paper entitled "MEDLINE", by Prof. A. Neelameghan (DRTC, Bangalore). He started his presentation with a brief description of the features of MEDLINE (MEDLARS-ON-LINE) System and then dealt with examples illustrating three points that might be of interest in the context of the ESRIN/RECON demonstration which was going to be held on 20th September, and our more general concern regarding access to remote data bases. The examples which he gave related to (i) MEDLINE service via satellite communication; (ii) Problem of MEDLARS/MEDLINE service to widely dispersed user populations in developing countries; and (iii) International arrangements for MEDLARS/ MEDLINE services.

Shri A.S. Raizada presented a paper on the CHEM/SDI project in India. He dealt with the SDI (Selective Dissemination of Information) concept. He mentioned that CHEM/SDI is a pilot project of UNESCO/UNISIST for computerised SDI in South Asia. This project has been taken under NISSAT programme with the financial support of the Department of Science and Technology and is jointly operated by INSDOC, New Delhi and IIT, Madras. CHEM/SDI is a current information retrieval service. It uses CAC (Chemical Abstracts Condensates) magnetic tapes. The CHEM/SDI selects current information from journals, reports, books, patents and conferences that are incorporated in the latest issue of CAC tapes. The selection and matching is accomplished by a fully computerised process matching individual profile against current CAC tape. He also dealt in detail with various sequence phases which should be executed to provide CHEM/SDI service.

The last paper in the afternoon session was "Machine-Readable Bibliographic Data Bases with special reference to the experience of India in participating in AGRIS System" by P.C. Bose which was presented, in the author's absence, by Shri S.P. Phadnis of IARI. In his paper Shri Bose mentioned that agriculture is fairly well documented in literature sources. Survey of world agricultural documentation services, published by FAO in 1973 has categorised 124 title services (29 computerised) and 230 abstracting services (45 computerised) published in 41 countries and 21 languages. Their annual output covered 632,000 title citations and 1,137,000 abstracts. Among the important indexing services with world-wide coverage is the "Bibliography of Agriculture", compiled in the United States Department of Agriculture (USDA), National Agriculture Library (NAL), since 1942 and published from a cataloguing and indexing (CAIN) computer tape. Among the abstracting journals, "Biological Abstracts" and "Chemical Abstracts" and their associated current awareness title indexes and the publications of the Commonwealth Agricultural Bureaux (CAB) are the important sources. He also described the International Information System for Agricultural Sciences and Technology (AGRIS) covering input methods and the output services available in two forms:

- a printed monthly bibliography called AGRINDEX
- an output magnetic tape, the format of which can be adapted to meet the needs of individuals, research programmes and national and regional information centres. The magnetic tape can also provide services such as SDI, retrospective search and on-line retrieval.

He also dealt with AGRIS operations in India.

3. SYSTEMS FOR ACCESS TO BIBLIOGRAPHIC DATA BASES

3.1 OFF-LINE OR BATCH PROCESSING SYSTEM

In this system, the search topic is translated into search strategy, usually in the form of Boolean algebraic expressions using logical expression AND, OR, NOT. The search strategy is put into machine-readable form and is then matched against the machine-readable file of indexed citations. Searches are carried out when computer time is available, and a number of searches are "batched" and run simultaneously.

3.1.1 Limitations of Batch Processing System

1. There is no direct interconnection between the user (i.e., the person with the information need) and the system. Therefore, the user cannot conduct his own searches. The searching work is done by the information specialist who acts as an intermediary between the user and the system. The search strategy is prepared by the intermediary who acts as a search analyst. This type of searching may have certain advantages, but it has one fundamental disadvantage, namely, the danger of analyst misinterpreting a requester's information need or the user himself sometimes may not be able to express his need verbally with sufficient accuracy to effect a successful search.

2. As the searcher has essentially only one chance to conduct a successful search, the analyst has to think, in advance, of alternative approaches and must incorporate them into his strategy. If the results of search are disappointing, he can obviously try again, but this will usually mean a further delay while waiting for the availability of machine-time once more.

3. A batch processing system almost inevitably involves time delays. In many systems, the response time is several days to weeks. Therefore, it becomes difficult for a user to obtain an immediate ("real time") response to his request.

3.2 ON-LINE SYSTEM

An on-line system differs from an off-line system in that the searcher, via some type of terminal, has immediate access to the data base and can interrogate it directly, structuring his strategy at the terminal, receiving responses from the system, and modifying the strategy on the basis of responses received. The entire search can be conducted in a matter of minutes, and the output (of citations, abstracts, or possibly full text) displayed on a console or typed out at a machine-controlled typewriter which is part of the user terminal. For a search retrieving very many citations, the searcher once he is satisfied with his strategy and has received some specimen printouts or displays on-line, can request that the full search results can be carried out off-line and sent to him at a later time. The main advantages of on-line system are:

- Browsing in this system is possible.
- Search strategy can be developed at the counter and the user can experiment with various approaches.
- User is able to obtain the results immediately and he himself conducts the search at the terminal without the help of intermediary.

3.4 ON-LINE SEARCHING

Searching in an on-line system is an interactive process. In this system, searcher can try various terms, term groups, or term combinations and immediately find how many citations match the exploratory strategy. Searcher can then broaden or narrow the scope of the search by adding descriptors, or he can try a completely different search approach. He can browse in the data base to determine the type of documents retrieved by a particular strategy. When he finds a relevant item, he can view all the descriptors assigned to it. Possibly, he will find further terms that can be incorporated into his search formulation.

4. ESRO/ELDO SPACE DOCUMENTATION SERVICE

A joint ESRO/ELDO Space Documentation Services (SDS) was created in 1964 with the aim of providing scientific and technical documentation to government establishments, universities and industries in European Community member states.

In 1969, after negotiations with NASA, SDS envisaged adopting in Europe the RECON (REMOTE CONSOLE) on-line retrieval system, developed in the USA for NASA by the Lockheed Missile and Space Co., Pale Alto (California).

The first on-line terminal was installed in Paris in July 1969 and a version of the RECON/DIALOG programme was adapted under contract with Lockheed to be used on the IBM 370/155 at ESOC (The European Space Operation Centre of ESRO) in Darmstadt, W. Germany.

4.1 HIGHLIGHTS OF ESA SPACE DOCUMENTATION SERVICE

1964: SDS created by European Space Research Organisation and European Space Vehicle Launcher Development Organization to provide information services to scientists and engineers in Member States.

1969: RECON on-line interactive information retrieval system installed.

1970: First remote leased line terminal outside ESRO/ELDO establishments. First Transatlantic cable demonstration of RECON system.

1972: First Transatlantic satellite demonstration of RECON system.

1973: SDS transferred to Frascati, Rome, Italy. IBM 360/50 computer installed at Frascati dedicated to RECON system.

1975: ESRO became the European Space Agency. Users able to access SDS file via dial-up terminals. IBM Computer upgraded to 360/65.

4.2 RECON NETWORK IN EUROPE

RECON is a remote access, on-line interactive retrieval system which permits the user to retrieve instantaneously information held in ESRIN, Frascati. Terminals are now located in France, Netherlands, the United Kingdom, The Federal Republic of Germany, Spain, Sweden and Denmark. Recently, a terminal has been set up at Rabat, Morocco. This network covers 10,000 km and has 76 terminal nodes all over Europe (See Appendix I).

4.3 DATA BASES

The ESRIN Centre has at present 12 data bases and provides access to over 7.5 million references drawn from them. The monthly addition comes to some 100,000 references. Some of the data bases covered are NASA, CA CONDENSATES, INSPEC, COMPENDEX, Nuclear Science Abstracts, NTIS, METADEX, World Aluminum Abstracts, the Environment Abstracts and Science Citation Index. This vast store of information was available for search in India during the demonstration from 20th September to 25th September 1976 (See Appendix II).

4.4 THE RECON SYSTEM

The RECON system is an information retrieval system defined by the following characteristics:

- is of concept-coordination type;
- works in the interactive, on-line mode; and
- has a remote processing capability.

4.41 Concept-Coordination - means that the documents are described by a set of keywords (descriptors) defining by their association the contents of document unit. They are retrieved by logic associations of descriptors, by means of the usual Boolean operators OR, AND, AND NOT.

4.42 Interactive - means that the system response time for each elementary enquiry is of the order of magnitude of that of the human operator so that a real interaction has to occur at the man/machine interface.

The system user, by means of a very simple language, is able to visualize on a TV screen a fraction of a dictionary, select pertinent descriptors, combine them by Boolean operators and display a document surrogate on the same screen when required, in a real conversational routine.

4.43 Remote-Processing - means that the user can have access to the system by means of visualization terminals which can also be located far from the central computer. The link between the central computer and the remote stations (terminals) is realized normally by means of four wire telephone lines, at a signal rate of 2400 bits/sec. Each remote terminal is equipped with a small (1K byte) buffer memory, a keyboard, a TV screen and a 30-character-per-second teletype.

4.44 The RECON Language - The language which is used with the RECON system at the user/terminal interface is very simple. The various commands can be grouped as follows:

1) Master Commands (MCS): These commands can be executed only if entered at a terminal having the so-called "master status". Normally, there is only one master terminal in the network and the MCS are used to supervise the system.

2) General Commands (GCS): The GCS are used to preset the system for a search, to perform tutorial or explanatory routine or to exchange messages between terminals. There are, in particular, five GCS:

a) Begin and End Search Commands,
b) Switch Files,
c) Set History,
d) Tutorial Commands, and
e) Message Capability.

3) Operation Commands for Terminology Access (OC/T).

4) Operation Commands for Search Strategy Development(OC/S) - The following commands, namely, SELECT, INTERSECT, COMBINE, KEEP and LIMIT perform the actual search strategy that translates the user's question into the System Language.

5) The Operation Commands for Document Reference Access (OC/D) - The document references are accessible by using both the DISPLAY DOCUMENT and PRINT commands in five formats:

Format 1: Only the accession numbers. 80 accession numbers can be displayed.

Format 2: The complete format with accession number, title, micro-abstract, authors, corporate source, bibliographical data and descriptors. Documents in this format are displayed one by one on the TV screen.

Format 3: Dump format, containing all the information of format 2.

Format 4: Only accession number, title and micro-abstract. 4 documents are displayed in one screen image.

Format 5: Similar to format 2, but without descriptors.

5. ESRIN/RECON ON-LINE DEMONSTRATION IN INDIA

Development of telecommunication facilities has made long-distance on-line information retrieval possible. The network concept is also thereby gaining currency throughout the world. In order to demonstrate the possibility of introducing on-line interactive information retrieval systems using telecommunication facilities in the developing countries, UNESCO/UNISIST sponsored in India a project, viz., "ESRIN/RECON On-line Demonstration Project-Linking to World Sources of Information". The ESRIN Centre in Frascati, near Rome, which has about a dozen data bases and access to some 7.5 million references in science and technology drawn from the data bases was made accessible in the demonstration project. The demonstration was held in the Tata Institute of Fundamental Research, Bombay, during 20-25 September, 1976. It was organised by the Department of Science and Technology, Government of India, in collaboration with the P&T Department, the Overseas Communications Service, the Tata Institute of Fundamental Research, BARC and INSDOC. The project was inaugurated by the Union Minister of State for Information and Broadcasting, Shri V.C. Shukla. During the demonstration, the data bases in ESRIN were searched from a terminal at TIFR, Bombay. The retrieved references were seen on a screen and had as printouts, if required.

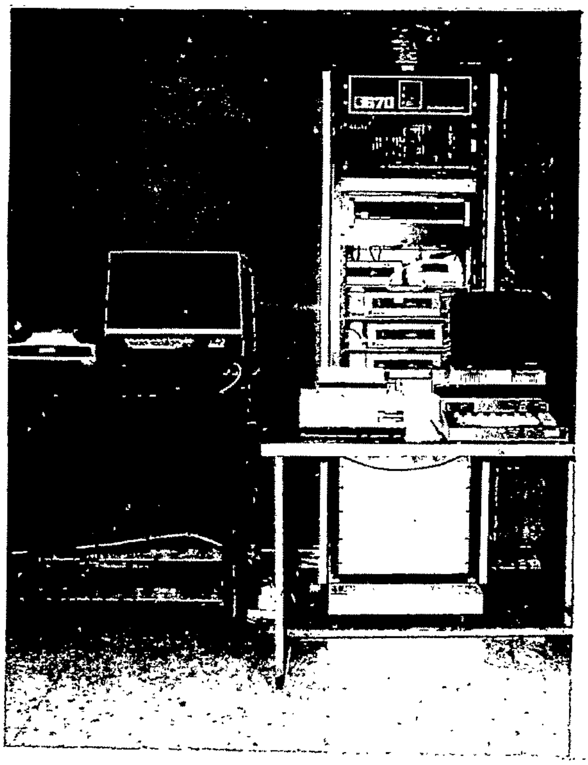
Welcoming the elite gathering of technocrats, Dr A. Ramachandran, Secretary, Department of Science and Technology, said that the demonstration project was a collective venture of several scientific departments and agencies such as TIFR, BARC, INSDOC, the P&T Department and the Overseas Communications Service.

Dr Ramachandran further said that the National Committee on Science and Technology had specifically identified information as a vital national resource and stressed the need for organising scientific and technical information as an important programme in the Fifth Plan. He pointed out that the main function of the National Information System for Science and Technology (NISSAT) would be to speed up the flow of information. NISSAT would also nurture the growth of information analysis centres as well as the straightforward data bases and documentation services for the benefit of the planners, entrepreneurs and decision-makers.

Shri Shukla, while inaugurating the project, pointed out that the main object of the demonstration at TIFR was to demonstrate to our scientists the application of modern telecommunication technology to enable them to have instant access to vast stores of information held in data bases located at global distances.

While thanking UNESCO and ESA for their cooperation in India's efforts, Shri Shukla said that the country was very anxious to keep pace with modern developments in science and technology and would make great sacrifice for that purpose.

Mr L.E. Samarasinghe of UNESCO, said that developing countries need scientific and technical information systems of their own, laying emphasis on the type of knowledge most needed for social and economic development.



ESRIN/RECON Terminal at TIFR. Picture shows Modem, Video display screen and Key board

Mr W.A. Martin of ESRIN said that the information service of the European Space Agency comprises three important parts - (1) large computers with a huge store of references, (2) extremely advanced series of programmes, and (3) extensively developed network which offers a number of operational options. He hoped that India would be able to secure information from the European Space Agency.

Dr V.A. Kamath, Head, Library & Information Services, BARC, coordinated the efforts involved in this project, culminating in grand success. At the end of the session, he proposed a vote of thanks.

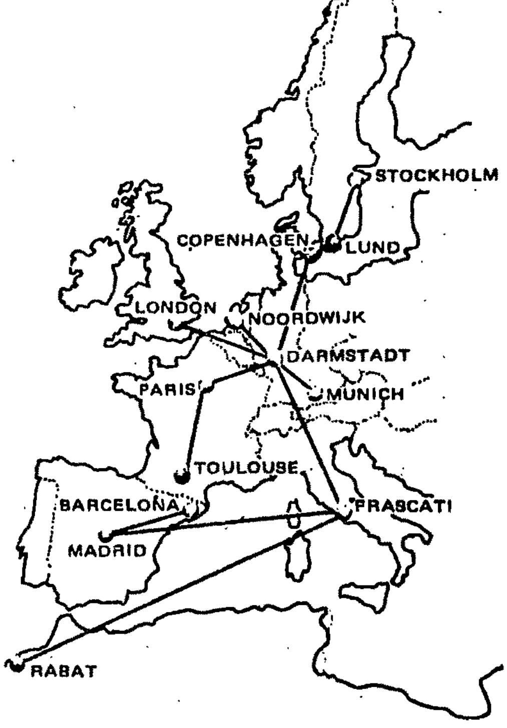
REFERENCES

[1] Isotta, N.E.C.: The ESRO System. Aslib Proc. 24(1): 31-37, 1971.

[2] Lancaster, F.W.: Vocabulary control for information retrieval. Information Resources Press. Washington, D.C. 1972.

[3] Romerio, Giovanni F.: A Teledocumentation network for Europe. Euro-Spectra, 12 No. 1, 12-25, 1973.

APPENDIX 1



Geographical distribution of present RECON network.

APPENDIX 2

RECON BIBLIOGRAPHIC FILE SUMMARY

1976-02

FILE NO	FILE NAME	SUPPLIER	ABSTRACT JOURNAL	SUBJECT COVERAGE	TIME SPAN	NO REFS DEC 1975	NO REFS YEARLY	UPDATE	ABSTRACTS
1	NASA	National Aeronautics and Space Administration, USA	Scientific and technical Aerospace Reports (STAR); International Aerospace Abstracts (IAA)	Multidisciplinary; science/technology; aerospace; materials; electronics	1962-	765.000	65.000	Monthly	No
2	CHEMABS	Chemical Abstracts Service, USA	Chemical Abstracts	Biochemistry; organic macromolecular, applied, physical, analytic chemistry; chemical engineering	1969-	2.005.000	400.000	Quarterly	No
3	METADEX	American Society for Metals, USA	Metals Abstracts	Applied; theoretical metallurgy; properties of metals/alloys	1969-	187.000	30.000	Monthly	No
4	COMPENDEX	Engineering Index Inc., USA	Engineering Index	Civil, electrical, mechanical, metallurgical, engineering; electronics	1969-	450.000	110.000	Monthly	Yes
6	NTIS	National Technical Information Service USA	Governments Reports Announcements	Multidisciplinary; science/technology	1970-	186.000	60.000	Monthly	No
7	NUCLEAR	Energy Research and Development Agency, USA	Nuclear Science Abstracts	Multidisciplinary; nuclear science/technology; physics	1968-	480.000	60.000	Monthly	No
8	INSPEC	Institute of Electrical Engineers, GB	Physics Abstracts; Electrical Engineering and Electronics Abstracts; Computer and Control Abstracts	Multidisciplinary; Physics; electrical engineering; electronics; computers; control; automation	1971-	650.000	140.000	Monthly	Yes
9	ALUMINUM	American Society for Metals, USA	World Aluminum Abstracts	Aluminium science, technology, applications	1968-	45.000	6.000	Monthly	Yes
11	ENVIRON	Environment Information Center, USA	Environment Abstracts	Environmental engineering; energy; pollution; resources	1971-	48.000	18.000	Monthly	No
17	ISI	Institute for Scientific Information, USA	Science Citation Index	Physical, chemical, engineering sciences	1972-	560.000	160.000	Monthly	No

APPENDIX 3

PORTION OF A PRINT OUT FOR A QUERY ON FLOATING POINT PROCESSORS

```
                    TITLE        NUCLEAR POWER PLANT
                    DATE/FILE    9-24-76/7
                    SEARCHER     RAMACHANDRAN V
                    REQUESTOR    RAMACHANDRAN
                    ADDRESS      PPED HOMI BHABHA RD COLABA
                                 BOM400005
USER 193    DATE:09/24/76    TIME:10:51:51

              SEARCH HISTORY                         PRINT SUMMARY
SET ITEMS DESCRIPTION                     NO. FILE ACCN/SET FMT    ITEM-RANGE
  1  5411 NUCLEAR POWER PLANTS              1    8       24   4       1-3
  2   506 ENERGY RANGE
  3   232 ENGINEERING
  4     0 1*2*3
  5    13 1*3
  6     4 E5,E6 MARX GENERATORS
  7     3 E6,E7 TESLA TRANSFORMERS
  8     1 BLUMLEIN CIRCUITS
  9     4 E5,E6 CAPACITOR BANKS
 10     5 E6,E7 SPARK GAPS
 11     1 E6,E7 TRIGGERED SPARKGAPS
 12     3 E6,E7,E8 PULSE CHARGING
 13     4 E10,E14 INDUCTIVE SWITCHING
 14    87 E5,E6,E7 EXPLODING WIRES
 15     4 6-14
 16     0 7*8
 17   125 4+5+6+7+8+9+10+11+12+13+14
 18     0 4*14
 19     0 4*1-14
 20     0 8
 21   682 FLOATING
 22 10216 POINT
 23   556 PROCESSORS
 24     3 21*22*23

  SRCH TIME      7.55  PRINT COUNT       3  DESCS.:           3



  PRINT 24/4/1-3               USER 193  PAGE     1  (ITEM     1 OF     3)


76C04028  Inspec  859249  itcob
  Vector floating-point data format
  Higbie, L.C.
  Massachusetts Maritime Acad., Buzzards Bay, MA, USA
  IEEE Trans. Comput. (USA), Journal Paper, vol.C-25, no.1, Jan. 1976,
25-32
  CC: C8420, C9800, C8120  wgcaat, xraaaa, wcaaaf
  SH: data structures/ programming  TRT: THEORETICAL
  PT:  data  format/ reducing memory cost/ special purpose processors/
pipeline  processors/  a programming language/ array processor/ vector
floating point
  ABSTRACT:  Memory has always been a major factor in determining the
cost  of  a  computer  system.  Many  schemes  have  been proposed for
reducing   memory   cost   without  degrading  system  performance  or
increasing  system  cost  or  complexity  significantly.  This  paper
presents  a  particular data type that may have been used occasionally
by  programmers  who  have  had to simulate floating-point hardware by
software.  This  new  data type is useful in large scientific problems
and may be able to serve as a replacement for floating point data type
on   special   purpose  processors.  Its  hardware  implementation  on
orthogonal  and  pipeline  processors  is  discussed in detail and the
implications of these implementations for a programming language (APL)
(Iverson's language) are examined, 6 Refs
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ON CHANGE OF TITLES OF PERIODICALS Pt 4

B Guha
B K Sen
R N Neogi

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In this part the reasons for change of titles under two categories are discussed. They are: a) changes from subordinate to independent titles and vice versa, and b) simplification of titles. The pattern of changes under both the categories are brought out from 84 cases. A long title, it has been observed, can be simplified according to some well tried standard procedures.

97 Periodicals Changing over from Subordinate to Independent Titles

Titles of periodicals, it has been shown, often reflect various types of changes in the organisation, working and naming of the respective sponsoring agencies. Changes in titles of periodicals reflecting changes in the names of sponsoring agencies are quite common. A similar situation may arise if the same sponsor is bringing out a number of periodicals and each one of them is to be given an independent and distinct title.

The most common method of naming a group of periodicals of the same sponsoring agency has been to give them a common title and then identify each of them with a distinctive sub-title with or without a tag like series, section, part and so on. Periodicals of learned societies and institutions have been following this practice. When such parts or sections are given independent titles, the new titles may still resemble or have some affinity with the old generic title. This naturally depends on the character of the generic title and also on the requirements of individualisation. In other words, to what extent individualisation is required. In Table 45, we have listed 17 periodicals which have become independent in this way.

It may be emphasized that the periodicals were independent even before the changes in their titles indicated in the table were effected. The changes made them independent in name also. This change also has a pattern which is being discussed subsequently,

Table 45 - Periodicals taking on Independent Titles

	Changed to	Changed from [with date of last change]
1.	Architectural Forum	Magazine of Building - Architectural Forum, 1950-54
2.	Botanical Journal of the Linnean Society of London	Journal of the Linnean Society of London-- Botany, 1865-1968
3.	British Journal of Medical Psychology	British Journal of Psychology - Medical Section, 1920-22
4.	British Journal of Psychology	British Journal of Psychology - General Section, 1920/21-55
5.	British Journal of Radiology	British Journal of Radiology - British Association of Radiology and Physiotherapy Section, 1924-27
6.	Canadian Journal of Botany	Canadian Journal of Research - Ser C Botanical Sciences, 1935-50
7.	Canadian Journal of Chemistry	Canadian Journal of Research - Ser B Chemical Sciences, 1935-50
8.	Canadian Journal of Physics	Canadian Journal of Research - Ser A Physical Sciences, 1935-50
9.	Canadian Journal of Zoology	Canadian Journal of Research - Ser D Zoological Sciences, 1935-50
10.	Ceylon Journal of Medical Science	Ceylon Journal of Science - Sec D Medical Sciences, 1924/27-56/58
11.	IEEE Transactions on Power Apparatus and Systems	Transactions of the American Institute of Electrical Engineers - Pt 3 Power Apparatus and Systems, 1952-67
12.	Indian Journal of Chemistry	Journal of Scientific and Industrial Research - Sec B,

13.	Indian Journal of Experimental Biology	Journal of Scientific and Industrial Research - Sec C,
14.	Journal of Chemical and Engineering Data	Industrial and Engineering Chemistry - Chemical and Engineering Data Series, 1956-58
15.	Plasma Physics	Journal of Nuclear Energy Pt C Plasma Physics, Accelerators, Thermonuclear Research, 1959-66
16.	Product R and D	Industrial and Engineering Chemistry - Product Research and Development, 1962-68
17.	Zoological Journal of Linnean Society of London	Journal of the Linnean Society of London - Zoology, 1863-1967/68

In Table 45, we have taken 17 examples of titles where each one of the titles was being issued as a part, section or series of a main title, although issued separately. We have also taken a few cases where part, section or series were not specifically mentioned but specific sub-titles were attached. In all cases the relation between the main title and the specific title has been one of genus-species nature. The very first item in the Table is of this nature. In this case the renaming of the title has been of the simplest nature. Only the sub-title, namely, Architectural Forum has been elevated to the position of a main title without bringing in any other words in the new title.

Items 2 and 17 have become independent titles from the same parent title, namely, Journal of the Linnean Society of London. The specific titles in the former names namely, Botany and Zoology, have been combined with the generic title to produce the new titles. In this case the name of the Linnean Society is too valuable to be lost in any renaming. Perhaps, the place name could have been dropped without any serious loss to the new titles. It is surprising that the periodicals decided to bring in this change after more than hundred years (1865-1968) of the existence of the former titles.

Items 3 and 4 have become independent titles from the same parent title, namely, the British Journal of Psychology. The pattern of change is almost same as the former titles. There is hardly any change in the information content of the new titles except that they have been made completely independent.

The fifth item, namely, the British Journal of Radiology, has some interesting points to observe. The periodical started in 1896 and has gone through four changes. The first three issues of the first volume carried the title Archives of Clinical Skiagraphy and the fourth and last issue of the same volume appeared under the slightly changed title, Archives of Skiagraphy. But this new title was used just for one issue only. From the very first issue of the second volume the title changed to Archives of the Roentgen Ray. The next change brought in the word Radiology, replacing the earlier word Roentgen Ray. The last title from which the present title has emerged was the lengthiest and also the clumsiest of all titles which the publishers could think for the periodical. However, in this clumsy title two new significant words were introduced for the first time. They are the geographical affiliation 'British' and the character denoting term 'Journal' in the place of Archives. From this title it was quite easy to change over to the present independent title.

The next four titles (items 6 to 9) are relating to a set of periodical all of which had the same generic title earlier and were distinguished by a series indication and specific subject denoting terms. The change of title, carried out simultaneously, gave independent status to all the four periodicals. It may be observed that the new titles have a similarity and they could easily be derived from the earlier common title of the group. Since the geographical affiliation Canadian was already present in the general title, the renaming of the periodicals into independent titles was comparatively easier and less drastic.

The next periodical in the list (item 10) is from Ceylon. The change here is exactly on the same model as the Canadian periodicals discussed in the previous paragraph. This periodical also belongs to a group from which only one title has come into our sample. Like the Canadian example, the new independent title is a combination of the parent title (i.e., Ceylon Journal of Science) and the specific title of the series (i.e., Medical Sciences). It has not been necessary to add any extra word to get the new title.

Compared to the Canadian and Ceylonlese examples, discussed above, the two Indian titles (items 12 and 13) have emerged in a slightly different manner, although the reasons for changing must have been the same. It would be observed that the generic title in this case was very broad. Firstly, there was no geographical appellation. Secondly, the subject scope of the journal was indicated by such general terms as scientific and industrial research. The reason for this choice of terms has been due to the fact that the periodicals were initiated by the Council of Scientific and Industrial Research. Thirdly, no specific titles were assigned to the individual Sections. Consequently, in the renaming process the change was more. The geographical appellation Indian had to be attached and then the more specific subject scope of each periodical had to be indicated. This brought in the terms Chemistry and Experimental Biology. The resulting titles are, as can be seen in the table, Indian Journal of Chemistry and the Indian Journal of Experimental Biology. This has been, we believe, the chain of reasoning.

CENTRAL LIBRARY

Item no. 11 is of a slightly different type than all others that we have been considering so far. Changes on a number of counts have gone into the new title. First of all there has been a change in the name of the sponsoring agency. Secondly, the new name of the sponsor has appeared in its abbreviated form. The feature which is of our immediate concern here is that the new title is a blending of the generic and the special titles. The specific title, namely, Power Apparatus and Systems has very well fitted into the blending. As a result of the particular construction of the new title, it would be realised, a link would still be there between the different titles as all of them are named as IEEE Transactions on ...

This is a point to be observed. Even when a sponsor is obliged to put on independent titles for its group of periodicals, very often a tendency to maintain a link through their titles is observed.

Item no. 14 is an example of very straightforward change. Just the specific title of the series has gone into the new title with only the addition of the character denoting term Journal which was absent in the generic title. It would be observed that the whole of the generic title has been omitted in the new title.

Compared to this, the change in item no. 15 is even more drastic. Here the new title has not only omitted the generic title but has omitted a greater part of the specific title of the Part. The new title, namely, Plasma Physics, has no character denoting term (such as, journal, bulletin)nor any geographical appellation (such as, Indian, American). It stands with just two subject denoting terms.

Item no. 16 has completely eliminated the generic title and has accepted the whole of the specific title but in an abbreviated form. In this case also there is no character denoting term in the title. It may be pointed out that item no. 14, considered earlier, and item no. 16 belong to the same group and both of them had the same generic title. In the renaming of the titles, however, they have followed two different patterns.

To sum up, on the pattern in the change of titles considered in this Section the following points may be made. A periodical, while changing from the status of a part, section, or series of a parent periodical, may change its title in such a way that:

i) the specific title of the part, section or series is elevated to the position of an independent title, or

ii) both the generic title and the specific title may be combined in various degrees;

iii) some extraneous words may be brought in to be added to the selected words from the previous titles;

iv) the new title may be a completely new coinage disregarding all words in the generic title and the specific title.

971 Changing over from Supplements to Independent Periodicals

A similar situation, to what have been discussed above, is created when a regular supplement to a periodical attains an independent status. We have only four example in this group which are shown in Table 46.

Table 46 - From Supplements to Independent Titles

Changed to	Changed from [with dates of last change]
1. Index of Fungi	Review of Applied Mycology -Supplement, 1940-47
2. Memoirs of the Entomological Society of Canada	Canadian Entomologist - Supplement, 1955-63
3. Radiocarbon	American Journal of Science – Radiocarbon Supplement, 1959-60
4. Reviews of Modern Physics	Physical Review Supplement, 1929

It would be observed that three of the periodicals had no specific titles and they were referred to simply as supplements. Only one had something very close to a specific title, that is Radiocarbon Supplement (item 3). The first two could pull on with the arrangement for quite some time, for 8 to 9 years. However, the other two could tolerate it for about two years only.

There is hardly any pattern visible in the changes of the above titles. All the four periodicals have been associated with some corporate agencies and all of them have been supplements to very well established and recognised periodicals in their respective fields. From the point of view of the publishers, this appears to be a safe method of launching a new periodical.

972 Changing over from Editions to Independent Titles

In the next group we have four periodicals which started as special 'editions' of other periodicals. The four titles are listed in Table 47.

All the periodicals in Table 47 are sponsored by professional societies and associations. Although they were being published separately but in their titles they indicated that they were just editions of other well known periodicals sponsored by the societies or institutions. In the independent titles there

Table 47 - From Edition to Independent Titles

	Changed to	Changed from [with dates of last change]
1.	Analytical Chemistry	Industrial and Engineering Chemistry - Analytical Edition, 1929-46
2.	Chemical and Engineering News	News Edition, American Chemical Society, 1940-41
3.	Indian Journal of Applied Chemistry	Journal of the Indian Chemical Society - Industrial and News Edition, 1938-57
4.	Journal of Pharmaceutical Sciences	Journal of the American Pharmaceutical Association - Scientific Edition, 1940-60

is some trace of the edition name and also the general title. It is interesting to note that 'Analytical Edition' has changed to 'Analytical Chemistry'; 'News Edition' to 'Chemical and Engineering News'; 'Industrial and News Edition' to '... Applied Chemistry'; and '... Pharmaceutical... Scientific Edition' to 'Pharmaceutical Sciences;

973 Changing over from Independent Titles to Part, Section, and Edition

It appears some periodicals will always be found trying to swim against the tide. Although a large number of sponsors have been found to prefer independent status and titles for the group of periodicals under them, as discussed in the preceeding sections, some sponsors have decided to follow the opposite trend. Three such cases are listed in Table 48.

Table 48 - From Independent Titles to Part, Section, Edition

	Changed to	Changed from [with dates of last change]
1.	Journal of Polymer Science - Pt D Macromolecular Reviews	Macromolecular Reviews, 1967-68
2.	Organometallic Chemistry Reviews - Sec B Annual Surveys	Annual Survey of Organometallic Chemistry, 1964-66
3.	Rubber Age - Over-Seas Edition	Rubber Age and Tire News, 1917-20

It will be seen that three independent titles have become part of other periodicals by designating themselves as Part, Section, and Edition. In view of the trends discussed earlier, it is doubtful whether the three periodicals in Table 48 will continue for long with the new titles.

98 Simplification of Titles

In this broad Section we are going to consider as many as 56 titles of periodicals where we find changes have been made more to simplify the titles rather than for any of the reasons that we have considered so far. In the process of simplification some pattern is likely to be seen. Several of them had changes earlier also. The titles are first enumerated in Table 49.

Table 49 - Titles Simplified on Various Counts

	Changed to	Changed from [with dates of last change]
1.	Army	Army Combat Forces Journal, 1955-56
2.	Auk	Bulletin of the Nuttall Ornithological Club, 1876-83
3.	Biotechnology and Bioengineering	Journal of Biochemical and Microbiological Technology and Engineering, 1959-61
4.	British Bee Journal	British Bee Journal and Beek Keepers' Adviser, 1873-?
5.	Canadian Patent Office Record	Canadian Patent Office Record and Register of Copyrights and Trade Marks, 1892-1954
6.	Canadian Refrigeration and Airconditioning	Canadian Refrigeration and Airconditioning Journal, 1955
7.	Chemical Week	Chemical Industries Week, 1951
8.	Chemistry and Industry	Chemistry and Industry Review, 1923-31
9.	Clinical Research	Clinical Research Proceedings, 1953-57
10.	Connecticut Medicine	Connecticut State Medical Journal, 1940-58
11.	Crops and Soils	Whats New in Crops and Soils, 1949-58
12.	Datamation	Research and Engineering - Magazine of Datamation, 1955-57
13.	Engineering and Mining Journal	Engineering and Mining Journal Press, 1922-26
14.	Flight International	Flight, Aircraft, Spacecraft, Missiles, 1959-61
15.	Fuel	Fuel in Science and Practice, 1922-47
16.	Gas Age	Gas Age Record and Natural Gas, 1936-37
17.	Gas World	Gas World and Gas and Coke, 1963-67
18.	Hospital	Hospital Gazette, 1904-29
19.	Index to Dental Literature	Index of the Periodical Dental Literature, 1839/75-1936/38

20.	Indian Textile Bulletin	Indian Textile Industry (Cotton, Woollen and Rayon) Statistical Bulletin, 1955-61
21.	Iron and Steel	Iron and Steel Industry and British Foundryman, ? — 1939
22.	Irrigation and Power	Irrigation and Power Journal, 1949
23.	Journal of the American Dental Association	Journal of the American Dental Association and Dental Cosmos, 1937-38
24.	Mathematics and Computation	Mathematical Tables and Other Aids to Computation, 1943/45-59
25.	Mathematics Magazine	National Mathematics Magazine, 1934-49
26.	Mayo Clinic (Rochester, Minn) Proceedings	Proceedings of the Staff Meetings of the Mayo Clinic (Rochester, Minn), 1926-63
27.	Medical Laboratory Technology	Journal of Medical Laboratory Technology, 1951-70
28.	Microelectronics and Reliability	Electronics Reliability and Microminiaturization, 1962-63
29.	Microscope	Microscope and Crystal Front, 1962/63-67
30.	Mining Journal	Mining Journal and Commercial Gazette, 1835-43
31.	Motor Industry	Motor Commerce and Industry, 1919-48
32.	National Geographic	National Geographic Magazine, 1888/89-1961
33.	Nickel Bulletin	Mond Nickel Bulletin, 1928/29
34.	Nuclear Energy	Nuclear Energy Engineer, 1958-59
35.	Nuclear Industry	Forum Memo to the Members, Atomic Industrial Forum (New York), 1953-?
36.	Official Journal of Patents	Illustrated Official Journal (Patents), Abridgements of Patented Inventions, 1889-1931
37.	Packaging	Packaging and Packing Record, 1933-41
38.	Paint and Varnish Production	Paint and Varnish Production Manager, 1910-49
39.	Perceptual and Motor Skills	Perceptual and Motor Skills Research Exchange, 1952
40.	Personnel Magazine	Personnel Management and Methods, 1957-65
41.	Pharmaceutical Journal	Pharmaceutical Journal and Pharmacist, 1909-33
42.	Popular Science Monthly	Appletons Popular Science Monthly, 1895-1900
43.	Professional Photographer	National Professional Photographer, 1961-63
44.	Pulp and Paper	Pulp and Paper Industry, 1945-47
45.	Quick Frozen Foods	Quick Frozen Foods and the Locker Plant, 1941-52
46.	Rubber World	India Rubber World, 1899-1954
47.	Science Progress	Science Progress in the Twentieth Century, 1906-16
48.	Ship and Boat	Ship and Boat Builder International, 1964-67
49.	Solar Energy	Journal of Solar Energy Science and Engineering, 1957
50.	Soviet Atomic Energy	Soviet Journal of Atomic Energy, 1956-63
51.	Statistician	Incorporated Statistician, 1950-61
52.	Sugar News	Sugar Central and Planters News, 1919-26
53.	Texas Medicine	Texas State Journal of Medicine, 1905-63
54.	Textile World	Textile World Journal, 1915-21
55.	Times Science Review	Times Review of the Progress of Science, 1951-52
56.	World Health Statistics Report	Epidemiological and Vital Statistics Report, 1947-67

Even a cursory look at the long list of titles in Table 49 will reveal that simplification has been achieved by dropping words from titles which were present for indicating the nature or character of a periodical, geographical appellation, or subject scope. In some cases of the old titles, the subject scope was sought to be indicated by a group of words. Those have been curtailed in the new title.

The very first item is an interesting example. It had four words in the title. The first three were subject denoting terms and the last one a character denoting term. The new title has taken the first word only. Nothing could be simpler and shorter than this title.

The second title (item 2), namely, the Auk, follows a pattern which has been discussed earlier in Section 912, where we had the title Condor. Ornithologists appear to be happy to christen their journals by the name of birds. This symbolic name of a periodical has the advantage of doing away with the usual subject denoting terms, character denoting terms, geographical appellation and the name of the sponsoring agency. The subject scope of such a periodical is indirectly indicated by the symbolic name.

In the renaming of the next title (item 3), the rather clumsy subject denoting terms have been replaced by more concise terms. With the development of subjects, precise names often come up and they are reflected in titles of periodicals devoted to these fields. At the same time the character denoting term has also been dropped. Otherwise, the title could have been Journal of Biotechnology and Bioengineering - quite an acceptable title.

The old title of the next periodical (item 4) had, in fact, two titles in it. The second part of the title, namely, 'Bee Keepers' Adviser' was in a way superfluous, as it did not add any new information. Hence, simplification meant dropping this part of the title only without any other change.

The next title (item 5) has gone through series of changes since 1873. The words of the present title, however, have formed part of all the previous five titles. In addition to these words, the previous titles had carried such words as 'Mechanics Magazine', 'Scientific Canadian Mechanics Magazine', 'Industrial Arts' and 'Register of Copyright and Trade Marks'. All these have been found to be superfluous in the new title. In fact most of the national patent offices deal with copyrights and trade marks.

The title Canadian Refrigeration and Airconditioning (item 6), it would appear, has emerged by just dropping the word 'Journal' from its immediate previous title. In fact, to start with, in 1935, the word 'Journal' was not there in its title. It was introduced later in 1943. It may be recalled that we have discussed earlier similar instances. On the basis of them it may be safely said that the inclusion of simple character denoting terms like Journal, Bulletin, etc are becoming superfluous.

The title Chemical Week (item 7) indirectly also tells that the periodical is a weekly. To that extent it is a frequency denoting term. The earlier titles of the periodical were Chemical Markets, Chemical Industries, and Chemical Industries Week. Thus, in the first two titles, the emphasis was on subject denoting terms, while in the last two titles, including the present one, the frequency denoting term 'Week' was introduced. The construction of the present title is such that it cannot be further shortened by deleting any of the two terms. Hence, any change either in the subject scope or in the frequency of the periodical will mean complete change in its title.

The next three titles (items 8, 9 and 10) have something in common. The change in the first two titles has come by simply deleting the two character denoting terms, 'Review and Proceedings' with no other change. In the third title also the character denoting term 'Journal' has been dropped but along with some other changes. This periodical had earlier titles like the Proceedings, Connecticut State Medical Society; Journal, Connecticut Medical Society; and the Connecticut State Medical Journal. So it has tried two character denoting terms and finally decided to use none.

It is surprising that item no. 11 could continue with an unncessarily long title like Whats New in Crops and Soil for full ten years before the need for simplification and change was felt. The new title has very rightly picked up just the two significant words from the old title and that have been found enough to indicate the scope of the periodical. Incidentally, the periodical is brought out by the American Society of Agronomy.

If the previous item had something like unnecessary paraphrasing of the scope in its old title, then the present one (item 12) had a formidable array of subject denoting terms in its old title and also one character denoting term, that is, Magazine. All that have been eliminated and only one subject denoting term, namely, Datamation, has been taken for the new title.

The change in item no. 13 is trivial in the sense that only the last word, that is, Press, was dropped without any other change. One wonders why this appendix was allowed to continue for full five years. The periodical, it may be mentioned, had a conventional title to begin with (in 1866), namely, American Journal of Mining. Through several changes it took up the title Engineering and Mining Journal Press, where the last word is inexplicable. The last change has definitely simplified the title.

The changes in item no. 14 have some interesting points to observe. The periodical is sponsored by the Royal Aeroclub of the United Kingdom and had its humble beginning, in the very early days of aviation, in 1908, as a section of another title, namely, Auto-motor Journal - Flight Section. As aviation progressed the title of it also changed. The first independent title it be taken up was as simple as 'Flight'. After that more and more words were added in the title to change it to the Flight and the Aircraft Engineer (1917-19) and then to Flight, Aircraft, Spacecraft, Missiles (1959-61). Although the last title carried in it the impression of time and the progress of aviation, four successive subject denoting terms without anything else to support made the title a bit inconvenient. It may also be submitted here that too many punctuation marks in a title make it inconvenient to cite or handle it in any way. In fact the last title contained three commas separating four words. The reaction to this evergrowing length and more punctuation marks was that the title was changed again, and this time to a simple 'Flight International. In fact the significant word here is Flight, which was the original title of the periodical, the other word - International is just a support, a mere flourish.

Fuel in Science and Practice (item 15) has been cut down to only Fuel after simplification. Strictly speaking, all the three words in the previous title were in the category of subject denoting terms. However, all of them together could denote hardly anything more than the single word Fuel. The former title was more in the pattern of the title 'Whats New in Crops and Soils' (item 11) that we considered earlier. They were more in the nature of paraphrase of the contents of the periodicals rather than precise titles.

The next two periodicals (items 16 and 17) have a few things in common. Both of them are on the subject of gas. They started more or less during the same time, 1883 and 1884 respectively, from New York and London. Both of them have gone through a number of title changes. At one time the periodical Gas Age was entitled Progressive Age. From that it changed to Gas Age (during 1913-21) but soon started adding more terms to it. First, it was extended to Gas Age Record, and then with more additions to Gas Age Record and Natural Gas. Ultimately, both the periodicals have simplified the titles by picking up the most significant word, that is, Gas in their respective titles. This single word has been metaphorically amplifed by the term Age in one case and World in the other case. The idea is to carry the sense of the age of gas in one case and the world of gas in the other. It may also be observed here that like too many punctuation marks, the use of too many conjunctions in a title makes it clumsy and inconvenient. Such titles are prone to changes.

The next periodical Hospital (item 18), coming out from the Institute of Hospital Administration, London, has got the present title by just dropping the character denoting term Gazette in 1930. The subject of the periodical is actually hospital administration which is sought to be expressed in the single-worded title Hospital. Since no medical periodical is likely to carry such a title, it is assumed the title hospital will give the idea of hospital admininstration.

The title Index to Dental Literature (item 19) is a simplification of the earlier title got by dropping the unnecessary word periodical. In most indexing periodicals, the usual type of literature that is included is periodical or journal literature. Hence, it is superfluous to indicate in the title of such a publication that it includes periodical literature

The Indian Textile Bulletin (item 20) had to eliminate double the number of terms from the previous long title to arrive at the present title in the process of simplification. For seven long years it had a long and most inconvenient title. The grammatical construction was such that can hardly be accepted in a periodical title. The expression textile industry was unnecessarily sought to be explained by the inclusion of three words in the title, namely, cotton, woollen and Rayon. The more awkward aspect of it was that the whole phrase, with punctuation mark and conjunction, was introduced in parenthesis. To make a title more inconvenient, hardly any other device can be thought of. It may also be mentioned that the periodical is a government publication coming from the Office of the Textile Commissioner. Perhaps, a commercial publisher would not have coined such a title.

The Iron and Steel (item 21) is the simplest of titles compared to the other two titles experimented by the periodical. The other two titles were the Iron and Steel Industry, and Iron and Steel Industry and British Foundryman. In the second title a geographical appellation was also brought in by the introduction of the word British. There were too many subject denoting terms in the title. All these have been very much simplified in the new title.

The periodical Irrigation and Power (item 22) is a splinter from another periodical where the focus was on Irrigation. After it got separated, the term Power was also added to indicate the focus of the new periodical. The last change was comparatively simple, that is, just the elimination of the character denoting term Journal. Here is then another instance to prove that character denoting terms, such as, journal, bulletin, annals, etc. are not very much liked in the titles of modern periodicals.

Journal of the American Dental Association (item 23) is a typical conventional title for a periodical which is an official organ of a professional association. The editors of the periodical appears to have been in an experimental mood and sought to bring in some colour into the otherwise drab conventionalism by introducing the imaginative expression 'dental cosmos'. In this addition we find again a tendency to bring in supporting terms. We have already considered such titles as Gas Age, Gas World etc. Dental cosmos is an expression of exactly same nature. This expression, however, was allowed in the title just for two years only (1937-38). Demands for simplification, rather than anything else, must have removed it.

The American Mathematical Society's periodical Mathematics of Computation (item 24) has brought in considerable simplification in its title. The periodical continues to have the same subject scope but has been able to express it in a much simpler way in the new title. It may be observed that both the words in the present title were contained in the previous title but a lot more have been eliminated to create a simple title.

The next title (item 24) is also in the field of mathematics. The structure of the immediately preceeding title can be considered together with that of the title of item No. 32. In one case the title was National Mathematics Magazine and in the other case it was National Geographic Magazine. In the former case the change has shortened the title to Mathematics Magazine. The supporting word 'National' has been dropped. In the second case this word has been retained while the character denoting term 'Magazine' has been dropped. This has given us the new title National Geographic. It may be recalled that the celebrated periodical National Geographic Magazine had existed under this title for 120 volumes since 1888. The expression 'national geographic' has been deeply impressed in the mind of users. In fact the periodical was being referred to by this shorter name. Perhaps, for this reason and also the fact that this is a publication of the National Geographic Society, the publisher has preferred to retain the word National in the new title. The alternative title, in the manner of Mathematics Magazine, would have been Geographic Magazine.

The Mayo Clinic (Rochester, Minn) Proceedings (item 26) is surely an inconvenient title to read, cite or transcribe. Even this is a much simpler form of what it was. The main difficulty in this title is, naturally, because of the use of place and state names in parenthesis. Considering what has been said earlier (in respect of item 20) it can be reasonably expected that this title will have another change shortly.

When the scope of a periodical has to be described by the use of a number of subject denoting terms, the use of other terms has to be minimised or completely dispensed with. The periodical Medical Laboratory Technology (item 27) was actually caught between such considerations. It is a journal of the Institute of Medical Laboratory Technology. It started, in 1913, with the unexpressive title Laboratory Journal. In this title the subject scope is not clearly revealed. Realising this defect, the subject denoting terms were extended by borrowing the relevant terms from the name of the sponsoring agency. The new title became Journal of Medical Laboratory Technology. If the specific scope of the periodical is medical laboratory technology then the only way to simplify or shorten the title is to delete the other available term, that is, journal. This is how the present title has emerged, without any character denoting term.

Microelectronics and Reliability (item 28) is a much simpler title than the previous one. Electronics is a rapidly changing field and terminology also changes. What was indicated by microminiaturization earlier is now indicated by microelectronics in the title. Because of the appearance of this term the appropriate context of Reliability is provided. It is no longer necessary to say Electronics reliability. This is how simplification has come in this title.

Nothing could be as simple as this simple title Microscope (item 29). The periodical has taken to this title after trying with two longer and complicated titles. The titles were the Microscope and Entomological Monthly and the Microscope and Crystal Front. Why exactly the expression Entomological Monthly was replaced by the expression Crystal Front is not known. However, as that part of the title was more prone to change, the publisher has done well to delete this part altogether.

The periodical Mining Journal (item 30) after using a longer and slightly inconvenient title for some years has decided to adopt the present title. If the present title is acceptable, perhaps, a title like just Mining will be equally acceptable. But there is already a periodical with that title. The next item also (item 31) is of a similar nature. The old title, namely, Motor Commerce and Industry, had all subject denoting terms with no other kind. This makes a title inconvenient and drab. The present title is simpler at the same time expressive also.

The periodical Nickel Bulletin (item 33) has gone through an interesting experiment just for the first volume. It is a publication of the International Nickel Ltd. The idea of international was tried to be reflected in the title by the use of its French equivalent, that is, 'mond'. That made the title Mond Nickel Bulletin. Very soon it was realised that the presence of the word international or its equivalent in a title does not mean much.

The periodical Nuclear Energy (item 34), started in 1947, has been very consistently changing its title after every two or three years. But since the last change, in 1960, it is continuing with the same title. It is not because the periodical is tired of changes but more because it has hit upon the simplest as well as the most appropriate title.

The next periodical (item 35) is also on nuclear subject. It is an organ of the Atomic Industry Forum (New York). In the previous title this fact was more tried to be reflected with no other consideration. As a consequence the title completely lacked the elegance and preciseness of a journal title. The periodical also must have changed in its character. All these are now reflected in the new title which has practically nothing in common with the old one.

The Official Journal of Patents (item 36) is a publication of the British Patent Office and had its origin in 1884 under the title Illustrated Journal of Patented Inventions. The periodical had gone through two more titles before it adopted the present title. In all the titles the principal idea, that is, a journal relating to patents has been reflected. In the first two titles the adjective 'illustrated' was there. In the last two titles, including the present one, the expression 'official' has been made very prominent. It is doubtful whether this word is serving any purpose. It has been noted that a number of periodicals originating from patent offices of a number of countries have been using the word 'official' in their titles. This appears to be a tradition in this field.

Packaging (item 37) is a neat modern title. But, then, it had to arrive at it through two earlier titles. It started with the title Packing Record. Structurally, the title had one subject denoting term (i.e. packing) and one character denoting term (i.e. record). In the next title, considering the subtle distinction between packing and packaging, both of them were introduced making the title read 'Packaging and Packing Record'. In the next title (present one), packaging was considered to be a better subject denoting term and a character denoting term was considered unnecessary. It may be noted that what was dropped this time was exactly the initial title with which the periodical started.

Paint and Varnish Production (item 38) had an appendage earlier by way of the word Manager. Only this has been removed without touching any other parts of the earlier title. Strictly speaking, the word Manager may be considered as an expression which is descriptive of the audience or the user community to which the periodical is addressed. Such words, it would be admitted, usually do not serve very useful purposes, especially, if the subject denoting terms are adequate in the title.

The periodical Perceptual and Motor Skills (item 39) was carrying in its two previous titles a very unusual character denoting expression, that is, Research Exchange. In fact this is the objective of all research periodicals. The addition of this expression in the title makes it hardly any more informative. Hence, it is quite natural that this part was decided to be dropped in the process of simplification.

The next title (item 40) Personnel Magazine has gone through a number of changes to arrive at the present title. At one time the title was a long one with only subject denoting terms in it. The title was Personnel Management, Welfare and Industrial Equipment. It is only in the present title that the subject denoting terms have been cut short to the minimum, that is only to Personnel, and a character denoting term has also been added. A title like Personnel Management also would have been equally suitable.

The Pharmaceutical Journal (item 41), started in 1841, had the word Pharmacist also in its immediate previous title. We have observed that this practice of naming the user in the title to indicate the subject scope rather than name the subject directly is a modern one and produces very often elegant titles. However, this periodical tried to telescope two titles, one conventional and one modern, into a single title. This tendency has been given up in the present title by adopting the conventional title only. It need hardly be pointed out that the deleted portion, i.e., Pharmacist would have been an equally good title.

The next title (item 42) i.e., Popular Science Monthly was displaying the name of the publisher also in its former title. Only that part of the title has been dropped without changing the title in any other way.

Professional Photographer (item 43) is a good example of a title where the subject scope is revealed indirectly through the name of the user. Incidentally this comes from the name of its sponsor which is the Professional Photographers of America. The geographical attachment was sought to be reflected through the inclusion of the word 'National' in the earlier title. This has been dropped in the present title.

Pulp and Paper (item 44) is an interesting case of a title where simplification has meant cutting short both the ends in two stages. The periodical started as Pacific Pulp and Paper Industry. In the first stage the geographical appelation 'Pacific' was dropped and in the second stage the word 'Industry' was dropped. One can only wish that this simplification could have been carried out in a single stroke.

In the title Quick Frozen Foods (item 45), all the three terms together mean a single subject. In its immediate previous title the periodical was carrying the additional load of 'and the locker plant'. This made the title too long without any appreciable advantage. In fact locker plant is so intimately associated with quick frozen foods that it hardly need be mentioned in the title. It is surprising that this simplification came after full twelve years.

It is difficult to imagine that a periodical with such a simple title as the Rubber World (item 46) could have started with a long and complicated title as the India Rubber World and Electrical Trades Review. The latter part of the title is really mysterious It made a strange combination with the first part. In the first change this strange combination was broken by dropping this portion and the new title became India Rubber World. As is well known, rubber has been known as India rubber due to historical reasons. In the next change, this was also simplified as rubber, instead of India rubber, as it came into common usage. Incidentally, the use of the supporting term 'World' may be noted. The usefulness of such terms has been discussed earlier in connection with the titles Gas Age, Gas World, etc (items 16, 17).

Science Progress (item 47) originated from a periodical of the same name. To make the new title quite distinct and at the same time retain its originality, the words 'twentieth century' were added. In the last change the same words have been dropped, as a result of which the periodical has come round to its original or parental title.

Ship and Boat (item 48) is a short but expressive title. The periodical, although of recent origin (1947/48), had experimented with three more titles, all of which were much longer but not more expressive. The titles were a) Ship and Boat Builder and Naval Architect, b) Ship and Boat Builder and Marine Trader, and c) Ship and Boat Builder International. It may be observed that there has been a common portion in all the three titles. It is the portion 'Ship and Boat Builder', which is also the most significant portion. This was only amplified by the other words. The third title introduced the word 'international' as something like a compensation for the loss of the ampliflying worlds in the first two titles. The use of the word 'Builder' was to produce the effect of personification of the subject. In other words, instead of name of the subject only, the professional was named.

Solar Energy (item 49) is a modern title with just the precise name of the subject and nothing else. However, to begin with, the periodical got into the fancy of a most conventional title, which was Journal of Solar Energy Science and Engineering. This title could continue for just the first volume.

Soviet Atomic Energy (item 50) is the cover-to-cover translation of the Russian periodical Atomnaya Energiya. For the first thirteen volumes of the translated periodical, the title was Soviet Journal of Atomic Energy. It may be observed that the translated periodical introduced the character denoting term 'Journal' in its title in the most conventional way. This only has been dropped in the change to make the title simpler.

Incorporated Statistician (item 51), organ of the Institute of Statisticians, London, was a bit inconvenient title in the sense that the word 'Incorporated' did not serve any purpose. It is in the fitness of things that this word has been dropped.

Sugar Central and Planters News (item 52) was a really inconvenient title. It is not immediately known why and how words like 'Central' and 'Planters' got into this title. The change, it would be observed, has eliminated these two inconvenient words and retained the most significant words from the previous title. The word 'News' serves more or less as a character denoting term.

Looking for scope for simplification the periodical Texas State Journal of Medicine (item 53) could find two words in the title for elimination. Texas means the Texas State. Hence, it was thought that the word 'State' was superfluous. Similarly, as it has been observed in a number of cases, the character denoting term 'Journal' was also considered unnecessary. With this elimination the preposition also could be eliminated. Thus, a five-worded title could be compressed into a two-worded neat title without loss of any information.

Textile World (item 54) appears to have been struggling for this simple title for a long time. The periodical started in 1888 with the title Textile Manufacturing World (1888-94) and subsequently changed to Textile World and Industrial Record (1897-1903). It may be observed that the present title was present in the old title but was mixed up with something else. Moreover, a character denoting term, that is Record was also brought into the title. The next change slightly simplified the title by eliminating the word 'Industrial' to read it as Textile World Record (1903-15). The next change replaced the character denoting term Record by Journal to read it Textile World Journal (1915-21) from which the present title has emerged very conveniently. Here is one more case where simplification in title has been made by totally eliminating character denoting term.

The next periodical (item 55) is a publication of the celebrated Times of London. The periodical had to change its title twice earlier. More or less the same idea which is conveyed by the review was tried to be conveyed by the more cumbersome expressions, such as, 'survey of the progress' and 'review of the progress' in the earlier titles. The realisation that the word review carries the same sense and also the currency of the word in the publishing world have made it possible to compress the title to Times Science Review.

Our last title (item 56) in the Table has changed the expression 'epidemiological and vital statistics' to 'health statistics'. This we have taken as a measure of simplification of the title.

981 Summary of the Pattern of Simplification

The previous Section has been a long one with comments on as many as 56 titles which have been simplified in various ways. Hence, it would be worthwhile to record here some of the important points in the pattern of simplification.

One common pattern has been the replacement of a number of subject denoting terms in titles into more precise and less number of terms in titles. In a number of cases we have observed that a title was actually composed of two titles, something like a compound title. One part of such titles has been dropped in such cases to make the titles simpler e.g. item no. 4.

Another tendency observed is to do away with character denoting terms, such as journal, record, review, etc, and thus make the titles shorter. It has also been observed that too many punctuations and conjunctions in a title make a title inconvenient. A number of changes have been made to remove such faults. A number of titles were coined in such a way that they sounded more like paraphrasing of the scope of the respective periodicals rather than titles, e.g. Whats New in Crops and Soil. Such titles have been simplified by putting greater emphasis on the subject denoting terms. In all cases that we have considered, the new titles have become shorter.

CHEM/SDI PROFILING

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In any computer-based information retrieval, user query formulation in machine readable form is an important element. This paper describes the various steps necessary for the creation of user profile in the CHEM/SDI System. The system was established in February, 1976 with the help of the CAN/SDI software package by the I.I.T., Madras and INSDOC, New Delhi. The different steps discussed for profile creation are: 1) drawing concept maps; 2) coding profile terms; 3) formulating search expressions; 4) feed back; and 5) corrections and modifications.

INTRODUCTION

In the world of today, it is necessary to disseminate information to various user categories in such a way that they are neither flooded with too much of information nor they are deprived of the essential information within an acceptable real-time frame. Such a process of dissemination to cater to individual requirements is called Selective Dissemination of Information. Computers are essential component in SDI services [5]. A computer-based information retrieval system, CHEM/SDI, was established jointly by IIT Computer Centre, Madras and INSDOC, New Delhi. This project searches CAC (= Chemical Abstract Condensates) tapes with user's profiles and the service is at a personalised and individual level which is a distinguishing feature of SDI. In other words, by this system, users are alerted every fortnight with a few references of their interests contained in the weekly issue of CAC tapes. This project is sponsored by the Department of Science and Technology and is supported by the UNESCO under UNISIST programme. This project which provides service to over 130 chemists and chemical engineers and technologists in India and neighbouring countries has been in operation since February, 1976 [6].

USER PROFILE

In any SDI, user interest profile creation is an important element. "The search profile is a list of terms representing the user's interests in the language of the data base and a statement of the logical conditions required for a match. In a computer search, anything that is machine-readable can be considered a profile-term and it consists of a word or word fragment from a title or abstract, key word, subject index term, journal coden, and authors' names, parts of the bibliography and so on. The task of profile construction is to choose those terms most likely to appear in the records of the data base. Therefore profile construction demands knowledge in natural language index vocabulary and controlled language index vocabulary used in the data base."

PROFILING

Construction of profile is more a technique than arranging key words horizontally and vertically. It depends not only on the knowledge of the subject matter but also on the ability to define the subject matter in terms of the contents of the "data base" [4]

Profiling requires the following operations:

1) Drawing concept maps
2) Coding profile terms
3) Formulating search expressions
4) Preparation of profile decks.

Drawing Concept Maps

This is a logical arrangement of profile terms. Terms arranged horizontally represent unique concept. Terms arranged vertically represent synonyms, related terms, narrow terms, trade names used for terms, etc. This concept map is a diagram which shows how the profile terms are related with each other, and is established by the Boolean logic operators AND, OR and ANDNOT used for grouping the profile terms [2].

For developing a good profile the following methodology has been used:

1) The profile submitted by the user must be thoroughly examined. It is necessary to know to what specific discipline does the profile belongs and the relation it seeks with the other disciplines. This can be inferred from the narrative statement defining the topic, subject codes, profile terms and citations, supplied by the users.

2) The next step is to enlist all the profile terms gathered from:

a) Profile Information Form; and
b) Other sources:

1. Thesauri
2. Classification schedule
3. Dictionaries
4. Subject indexes of chemical abstracts and secondary periodicals and also from specific articles in the primary periodicals
5. Books and their indexes.

3) Eliminating those terms which seem to be superfluous when truncation is applied and which are irrelevant.

4) Check the index terms of the Chemical Abstracts for vocabulary control as search is made with key words supplied for each reference in the Chemical Abstracts.

5) Add those terms which carry adjectival meaning to the terms for securing specificity.

6) Group the terms as per likeness (categorizing terms).

7) Combine these groups as per facet analysis with logical operators in order that unique concepts be obtained.

8) Observe and make out a useful combination by the information and references supplied by the user and from relevant titles that are earlier observed in the Chemical Abstracts. While observing, note the combination of the terms and syntax (natural language syntax) and the subject code of the references.

9) Compare the combinations which are arrived at in items Nos 7 and 8, so as to formulate a useful combination of both the facet analysis and natural language syntax.

10) Observe the possibility of relevant hit with single term or unique term search. This depends on the specificity the term establishes, the occurrence of literature with that unique term and finally the usefulness of such literature which contains the unique term to the user. Also if the published information is very rare and the term is novel, a single term concept is preferable.

While making an attempt to draw a better concept map the following shall have to be taken into consideration:

1) The profile terms consist of single words or phrases, authors' names, codes, etc.

2) Codes represent subject sections and their placement in the concept map, sets logic indirectly in the concept map, as they do provide subject classification or concept approach. The search would enable to narrow the search area or to eliminate references from a particular section. The subject codes must always be used with other terms, and also they take care of the semantic problems. For example, when a user is interested in all the heterocyclic compounds, mere placing the code in the concept map in the appropriate group would be sufficient instead of enlisting all the heterocyclic compounds [2]. Besides, it take care of the synonyms, related terms, narrow terms, trade names, etc.

3) Truncation plays a vital role in profile construction. Truncation is a technique used to facilitate retrieval of references containing word or code fragments which are common to two or more different forms of a word or code, e.g., between singular and plural forms, different terms of a verb, section of a code. Left-hand truncation retrieves any character combination preceding the term. Right-hand trunctation retrieves any character combination following the term [4]. Both sides truncation retrieves any character combination. While truncating, care must be taken to avoid noise. Consulting a dictionary is essential before truncating, so that irrelevant terms which can be also hit, can be safely avoided.

CAC DATA BASE

Profiling for retrieving CAC data base requires knowledge of CAC tapes. CAC is identical to Chemical Abstracts, except for abstracts which accompany each reference in the printed version. It is a weekly tape containing references on chemistry and chemical engineering. The odd-numbered issues contain references on biochemistry. The even-numbered issues cover analytical, physical, macromolecular and applied chemistry and chemical engineering. The tape can be searched in several ways. Computer can limit the search to certain areas of the tape. The areas of search depend on the selection of question types. The question types differ from tape to tape. The term type represents the question type in coded form and it is a single coded letter [2]. The following areas can be searched in CAC.

Author - A; Corporate Author - B;
Journal - C; Subject Section - K;
Types publication - K; Title, Keywords - T;

The entire area of the question types is of a record and search can be either on the entire record or a part of the bibliography thereof.

CODING THE PROFILES

The profile coding form has two sides. On the first side the name, address, phone number, narrative statement and the sample references supplied by the user will be entered. The profile terms of the concept map will be coded on the second side. All profile terms are coded alphabetically while care has to be taken that no two profile terms can have the same alpha code letter.

The term types, alpha codes and the profile terms themselves are entered in the columns headed TT, AC and the column headed Profile Words, respectively.

FORMULATING SEARCH EXPRESSIONS

Search Expressions are the symbolic representations of the concept maps and are formed by using alpha codes and logical connectors. The diagonal strokes are ORed connectors which are used for connecting those terms placed vertically in the concept map. These terms may be either synonyms related terms etc. The plus signs are AND connectors and are used for combining groups wherein, terms are listed and also for combining two or more individual terms within a group. The AND NOT symbol is used for eliminating profile terms from the other combinations [2]. Brackets are used for grouping ORed terms and through operator for stringing a number of consecutive alpha codes.

The search expression number, symbol of the tape, number of references to be retrieved - maximum being 99, will be entered in the columns headed EN, S and NR, respectively. The expression as such is entered in the column headed Search Expressions.

PREPARATION OF PROFILE DECKS

- Before punching, the profile shall have to be checked for spelling errors, logical errors and incorrect format:

The profile deck consists of three parts: 1) Address Deck, 2) Terms Cards, 3) Expression cards. These cards are punched as per coding rules on the punched cards.

CORRECTIONS AND MODIFICATIONS

Corrections

The profile shall have to be corrected for the following:

1) Spelling errors
2) Incorrect format
3) Logical errors.

Some of the logical errors can be listed as follows:

1) No Symbol for term
2) Duplicate symbol
3) Unmatched, "(" and ")" right and left brackets
4) Expression too complex
5) Illegal operator
6) No operator
7) Illegal use of " ⟶ " operator
8) Illegal double operator
9) Invalid character
10) Undefined symbol.

The errors mentioned above would be indicated in the computer output of profiles listing and the errors have to be corrected appropriately and resubmitted for correct profile listing for subsequent searching with the data base.

Modifications

After analysing the feed back, expression-wise, taking into consideration the profile terms caused for hit, modifications shall have to be made for the following reasons:

1) If the user changes his interest
2) If the profile is picking garbage
3) For recall
4) For precision.

1) If the user changes his interest, the changes will be incorporated in the profile in keyword form and the concept map will be redrawn after eliminating unwanted profile terms. The expressions in the machine-readable language will be changed correspondingly.

2) If the profile is picking garbage, the causes for garbage have to be noticed and expressions changed accordingly. Normally the garbage may be due to the following:

a) Wrong truncation
b) Single term Search
c) Incorrect format
d) Not placing the brackets properly.

3) Recall

If the number of groupings is more and the expressions are tight, the profile would normally pick only a few references. With the result the user will be missing many useful references. Hence the groupings shall have to be loosened and accordingly the expressions are to be changed.

4) Precision

If the number of groupings is small, high recall exists. Most of the items may be irrelevant to the user. Hence the concept map shall have to be tightened with a few more groupings and expressions changed accordingly, for securing precision.

In the light of the theoretical approach discussed earlier, let us proceed in developing a profile from the proforma of the profile No. 1180 (See Appendix No. 1).

From the proforma of the profile under discussion it can be gathered that the user is interested in the following aspects of electrochemistry:

1) Electrical double layer and electrode kinetics
2) Electroanalytical methods
3) Secondary batteries, Solar and fuel cells
4) Corrosion inhibition
5) Electrodeposition for molten salts.

The concept map for this is shown in Appendix No. 2.

The coding sheet and search expressions are shown in Appendix No. 3.

Let us observe the modifications made with the profile under discussion.

The profile picked garbage as the following terms are used as single search terms expression which are too generic or the format is incorrect. Some of the terms also seem to be irrelevant:

TT	AC	PROFILE TERMS
T	E	ACID
T	F	ACQUEOUS
T	J	ELECTRIC CONDUCTOR
T	AC	CORROSION
T	AD	INHIBITION
T	AE	INHIBITOR
T	AA	DEPOSITION

It is noticed from the feedback analysis that:

1) The profile terms "ACID" and "ACQUEOUS" do not seem to be useful even in combination with the term "ELECTROLYTE".

2) The user is not interested either in single term search or any combination thereof with regard to the term "ELECTRIC CONDUCTOR"

3) The profile term "CORROSION" seems to be useful in combination with the terms "INHIBITOR" or "INHIBITION".

4) The user is interested in the profile term "ELECTRODE" only in combination either with "ADSORPTION" or "KINETICS".

5) The profile term "DEPOSITION" is too generic a term, and the term "ELECTRODEPOSITION" would take care of the interest of the user.

6) The profile term "INHIBITOR" or "INHIBITION" is too generic and they are useful only in combination of the term "CORROSION".

7) The user is interested in the molten salts in combination with the profile terms such as: "ELECTROCHEMISTRY or ELECTROLYSIS or ELECTROLYTE".

8) The single term search with the terms such as: "POLAROGRAPHY" or "ELECTROANALYSIS" or "ELECTROCATALYSIS" or "ELECTROCAPILLARY" or "ELECTROCHEMICAL MACHINING" or "E.C.M." might retrieve useful referecences.

9) Single term search with "ELECTROLYSIS" is picking garbage. Hence it is decided to combine the profile term "ELECTROLYSIS" either with hydrogen evolution or molten salt or waste water treatment".

As such, the following terms have been either deleted or added, and the expressions changed appropriately.

PROFILE TERMS DELETED

TT	AC	PROFILE TERMS
T	E	ACID
T	F	ACQUEOUS
T	J	ELECTRIC CONDUCTOR
T	AA	DEPOSITION

PROFILE TERMS ADDED

TT	AC	PROFILE TERMS
T	BC	ELECTROCATALYSIS
T	BD	ELECTROCAPILLARY
T	BE	ELECTROCHEMICAL MACHINING
T	BF	E C M
T	BG	HYDROGEN EVOLUTION
T	BH	WASTE WATER

Please see 1) Modified concept map, Appendix No. 4
2) Modified coding sheet, Appendix No. 5
3) Modified expressions, Appendix No. 6.

CONCLUSION.

Profiling demands defining the topic more appropriately for translating into machine-readable query. In the bibliographic information retrieval, profile developing is for matching the terms either with appropriate combination or single term match. Indexing language (natural or controlled) vocabularies have a definite bearing in constructing a profile or formulating user interest query. Thesaurus approach or superordinate structure of the term would definitely solve this problem to some extent in building up a good profile. But, selection of key words plays an important role in profile creation as precision of retrieval mostly depends on it. Hence, selection of profile terms and the combination of these terms seek, shall have to be taken into consideration before attempting to construct a profile. User participation in constructing the profile is always desirable. Therefore, it is essential that the user must be trained or oriented to the system. Also, adequate tools for selecting the terms must be available for construction of the profile, i.e., Chemical Abstracts Search Guide for constructing profiles to search CAC tapes and so on. Constant search for the insertion of neologisms of the profile terms must always be made. Less powerful logic operators like "ignore logic" will ensure that the relevant items are not missed. "The structure of the IGNORE logic in profile is:

CHROM*
IGNORE
CHROMATOGRAPHY

As a less powerful than 'not logic', Ignore logic will disregard a chromatography match but will continue to examine the record. Thus a paper on the Chromatography of Chromates would be retrieved if the term Chromates appeared in the key word string." [3]

ACKNOWLEDGEMENT

We acknowledge with thanks the support rendered by Dr H. N. Mahabala, Sri C. Deenadayalu and Sri F. J. Devadason in bringing out this paper and Shri S. Parthasarathy for his encouragement.

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[4] CAN/SDI: Profile Manual. Canada Institute for Science and Technology.

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APPENDIX 1

PROFILE INFORMATION

1. Name: DR. R.NARAYAN

2. Position: ASST. PROFESSOR Telephone: EXT.223

3. Institution: INDIAN INSTITUTE OF TECHNOLOGY, MADRAS-600036.

4. Address: CHEMISTRY DEPARTMENT.

5. Topic (Please give a fairly detailed description of your field of interest. including any aspect not required).
   Electrochemistry - 1. Electrical Double Layer
   2. Electrode Kinetics 3. Polarographic Studies
   4. Chronopotentiometry 5. Corrosion Inhibition
   6. Electroplating of Chromeum and Chromeum alloys
   7. Secondary Batteries 8. Solar cells - Photo voltaic and photo galvanic cells
   9. Electrochemical studies in moltur salts 10. Fuel cells.

6. Please give section nos. of Chemical Abstracts (listed on the reverse) in which the above topic usually occurs.
   52, 55, 72, 74

7. Keywords pertaining to the above topic (general terms, such as 'Metals' should be expanded to the particular metals in which you are interested).
   Chromeum, Chromeum Alloys
   Adsorption at metal electrode (170026, Vol, 1975)
   Electro defsition Chromeum, Solar cell - Solar Energy Conversion
   Electrocapillarily
   Electrochemical mechining machening
   Fuel cell, Corrosion inhibitor/inhibition

8. Please list citation of at least five titles of relevant papers relating to the above topic.
   170077 mm Vol 83,1975
   170076 k Vol 83,1975
   170101 q Vol 83,1975
   170103 Vol 83,1975
   170125 a Vol 83,1975
   170134 c Vol 83,1975

APPENDIX 2

CONCEPT MAP

E01

ELECTROCHEMISTRY - A
or ELECTRODE* - B
or ELECTROLYSIS - C
or ELECTROLYTES - D

AND

ACID - E
or AQUEOUS - F
or BATTER - G
or FUEL CELL* - H
or MOLTEN SALT - I

ELECTRIC CONDUCTOR - J
or ELECTRODE KINETICS - M
or CHRONOPOTENTIOMETRY - P

DEPOSITION - AA
or ELECTRODEPOSITION - AB
or CORROSION - AC
or INHIBITION - AD
or INHIBITOR - AE
or CORROSION INHIBITION - AF
or SOLAR ENERGY CONVERSION - AG
or MOLTEN SALT - AH
or ELECTRICAL DOUBLE LAYER - AT
or BATTER - G AND SOLAR - AJ
or SECONDARY - AK
or CELL* - AL AND SOLAR - AJ
or PHOTOVOLTAIC - AN
or PHOTOGALVANIC - AP
or FUEL - AQ

AND Ca052* - BA
or CA074* - BB

E03

DEPOSITION - AA
or ELECTRODEPOSITION - AB
or CORROSION - AC
or INHIBITION - AD
or INHIBITOR - AE
or CORROSION INHIBITION - AF
or SOLAR ENERGY CONVERSION - AG
or MOLTEN SALT - AH
or ELECTRICAL DOUBLE LAYER - AI

Or BATTER* - G SOLAR - AJ
or SECONDARY - AK

or CELL* - AL SOLAR - AJ
or PHOTOVOLTAIC AN
or PHOTOGALVANIC AP
or FUEL - AQ

E04 ADSORPTION - AR AND ELECTRODE* - AS

E05 POLAROGRAPHY - AU AND ELECTROANALYSIS - AW

APPENDIX 3

PROFILE NUMBER

SHEET NUMBER

INSERT YOUR ADDRESS LABEL IN THIS BLOCK

DR. R. NARAYAN
ASST. PROFESSOR
CHEMISTRY DEPARTMENT
INDIAN INSTITUTE OF TECHNOLOGY
MADRAS-600036.

TELEPHONE

STATE YOUR SEARCH REQUEST IN NARRATIVE FORM. ADD TWO REFERENCES OF PAPERS PUBLISHED BY YOU OR A COLLEAGUE WORKING IN YOUR FIELD (PLEASE TYPE OR PRINT)

ELECTROCHEMISTRY 1. ELECTRICAL DOUBLE LAYER 2. ELECTRODE KINETICS 3. POLAROGRAPHIC STUDIES 4. CHRONOPOTENTIOMETRY 5. CORROSION INHIBITION 6. ELECTROPLATING OF CROMEUM AND CROMEUM ALLOYS 7. SECONDARY BATTERIES 8. SOLAR CELLS-PHOTOVOLTAIC AND PHOTOGALVANIC CELLS 9. ELECTROCHEMICAL STUDIES IN MOLTEN SALTS 10. FUEL CELLS

CHROMEUM, CHROMEUM ALLOYS ADSORPTION AT METAL ELECTRODE
ELECTRO DEPOSITION SOLAR CELL - SOLAR ENERGY CONVERSION
ELECTROCAPILLARY ELECTROCHEMICAL MACHINING FUEL CELL
CORROSION INHIBITOR /INHIBITION.

RELEVANT REFERENCES ARE:

170077m Vol. 83, 1975
170076k Vol. 83, 1975
170101q Vol. 83, 1975
170103 Vol. 83, 1975
170125a Vol. 83, 1975
170134c Vol. 83, 1975

LIST PROFILE WORDS AND SEARCH EXPRESSIONS ON REVERSE SIDE

Appendix 3 continued

TT	W	AC	PROFILE WORDS	TT	W	AC	PROFILE WORDS
T		A	ELECTROCHEMISTRY				
T		C	ELECTROLYSIS				
T		D	ELECTROLYTE*				
T		E	ACID				
T		F	AQUEOUS				
T		G	BATTER*				
T		H	FUEL CELL*				
T		J	ELECTRIC CONDUCTOR				
T		M	ELECTRODE KINETIC*				
T		P	CHRONO POTENTIOMETR*				
T		S	ELECTRO PLATING				
T		U	CHROMIUM				
T		AA	DEPOSITION				
T		AB	ELECTRO DEPOSITION				
T		AD	INHIBITION				
T		AE	INHIBITOR*				
T		AF	CORROSION				
T		AG	SOLAR ENERGY CONVERSION				
T		AH	MOLTEN SALT*				
T		AI	ELECTRICAL DOUBLE LAYER				
T		AJ	SOLAR				
T		AK	SECONDARY				
T		AL	CELL*				
T		AN	PHOTOVOLTAIC				
T		AP	PHOTO GALVANIC				
T		AQ	FUEL				
T		AR	ADSORPTION				
T		AS	ELECTRODE*				
T		AU	POLAROGRAPHY				
T		AW	ELECTROANALYSIS				
k		BA	CA052*				
k		BB	CA074*				
T		I	MOLTEN ƀ SALT*				

EN	S	NR	TW	SEARCH EXPRESSIONS
E01	C	99		((A/C/D&(E/F-I))/(J/M/P))
E02	C	99		((AA/AB-AI)/(G&(AJ/AK))/(AL&(AJ/AN-AQ)))&(BA/BB)
E03	C	99		((AA/AB-AI)/(G&(AJ/AK))/(AL&(AJ/AN-AQ)))
E04	C	99		AR&AS
E05	C	99		AU/AW

APPENDIX 4

MODIFIED CONCEPT MAPS. PROFILE No. 1180

E01

ELECTROCHEMISTRY . . . . A
OR ELECTRODEKINETIC . . . . M
OR CHRONO POTENTIMETR . . . . P
OR ELECTROLYTE*-D . . . . . and . . . . BATTER*-G
FUEL CELL*-H
OR POLAROGRAPHY . . . . AU
OR ELECTROANALYSIS . . . . AW
OR ELECTROCATALYSIS . . . . BC
OR ELECTROCAPILLARY . . . . BD
OR ELECTROCHEMICAL MACHINING . . . . BE
OR E C M . . . . BF
OR ELECTROLYSIS-C . . . . and MOLTEN SALT* -AH
Or Hydrogen Evolution-BG
OR WASTE WATER -BH

NOTIFICATION CEPT MAPS

PROFILE NO 1180 EXPRESSION No.2

ELECTRODEPOSITION . . . . AB . . .
OR CORROSION . . . . AF . . AND . . . INHIBITION* . . . AD
INHIBITOR* . . . . AE

OR MOLTEN SALT* . . . . AH . . and . . . ELECTROCHEMISTRY . . . . A
OR ELECTROLYSIS C
OR ELECTROLYTE* . . . . . D

OR ELECTRICAL DOUBLE LAYER . . . . AI
OR BATTER* . . . . G . . AND . . . SOLAR . . AJ
OR SECONDARY AK

OR CELL* . . . . AL and . . . SOLAR . . . . -AJ
PHOTOVOLTAIC . -AN
PHOTOGALVANIC . -AP
FUEL CELL . . . -AQ

and CA052* - BA
CA074* - BB

Continued

Appendix 4 continued

PROFILE No.1180

MODIFIED CONCEPT MAPS EXPRESSION No.E03

ELECTRODEPOSITION . . . . AB
OR CORROSION . . . . AF AND . . .
INHIBITION* AD
INHIBITOR* AE

OR MOLTEN SALT* . . . . AH. . and . .
ELECTROCHEMISTRY. . A
OR ELECTROLYSIS C
OR ELECTROLYTE . . . . . . D

OR ELECTRICAL DOUBLE LAYER. . . . . AI
OR BATTER* . . . . G. . and. . . .
SOLAR AJ
SECONDARY* AK

OR CELL* . . . . AL. . and. . . .
SOLAR AJ
PHOTOVOLTAIC AN
PHOTOGALVANIC AP
FUEL AQ

MODIFIED CONCEPT MAPS. PROFILE No.1180 EXPRESSIONOS. 4&5.

E04. ADSORPTION . . . AR and ELECTRODE* AS
E05. ELECTROPLATING S and CHROMIUM . . . U

APPENDIX 5

MODIFIED CODING SHEET

TT	AC	PROFILE TERMS
T	A	ELECTROCHEMISTRY
T	C	ELECTROLYSIS
T	D	ELECTROLYTE*
T	G	BATTER*
T	H	FUEL.CELL*
T	M	ELECTRODE KINETIC*
T	P	CHRONO POTENTIOMETER*
T	S	ELECTRO PLATING
T	U	CHROMIUM
T	AB	ELECTRO DEPOSITION
T	AD	INHIBITION*
T	AE	INHIBITOR*
T	AF	CORROSION
T	AG	SOLAR ENERGY CONVERSION
T	AH	MOLTEN SALT*
T	AI	ELECTRICAL DOUBLE LAYER
T	AJ	SOLAR
T	AK	SECONDARY
T	AL	CELL*
T	AN	PHOTOVOLTAIC
T	AP	PHOTO GALVANIC
T	AQ	FUEL
T	AR	ADSORPTION
T	AS	ELECTRODE*
T	AU	POLAROGRAPHY
T	AW	ELECTROANALYSIS
T	BA	CA052*
T	BB	CA074*
T	BC	ELECTROCATALYSIS
T	BD	ELECTROCAPILLARY
T	BE	ELECTROCHEMICAL MACHINING
T	BF	E.C.M.
T	BG	HYDROGEN EVOLUTION
T	BH	WASTE WATER

APPENDIX 6

MODIFIED EXPRESSIONS

```
E01 C 99      ((A/M/P/D&(G/H))/(AU/AW/BC/BD/BE/BF)/
E01           (C&(AH/BG/BH)))

E02 C 99      ((AB/AF&(AD/AE))/(AH&(A/C/D))/(AI/G&(
E02     AJ/AK))/(AL&(AJ/AN-AQ)))&(BA/BB)

E03 C 99      ((AB/AF&(AD/AE))/(AH&(A/C/D))/(AI/G&(
              AJ/AK))/(AI&(AJ/AN-AQ)))

E04 C 99      AR&AS

E05 C 99      S&U
```

THE LIBRARIES OF SOME FINANCIAL INSTITUTIONS IN BOMBAY

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The functions, budgetary provision, collections, services, and use of special libraries of a number of leading financial institutions in Bombay are discussed. It is felt that such libraries can be made to play a role of greater importance. Suggestions for improvement of the present situation are presented.

Bombay, the Gateway of India, is the nerve centre of trade and banking operations in the country. It owes its unique position as the financial capital of the country to the large number of financial institutions located in the city. Although these institutions serve different needs and have varying functions they are required to share information and knowledge with other commercial bodies. It is, therefore, necessary that some department or unit in such an organisation charged with the responsibility to gether, maintain and readily make available whatever information is required. Whether such a department is called a library or an information centre, it has a vital role to play in the smooth and efficient functioning of such an institution.

Purpose and Function

The first and foremost function of a special library is to meet all the information needs of the parent body. It collects, processes and disseminates information that is required and even attempts to anticipate future requirements.

To what extent did the libraries in the financial institutions in Bombay fulfil this function? It was this question which prompted visits to a number of financial institutions: to get an overall picture of the working environment of these libraries, to identify their common problems and to discuss these with the people working therein. Different kinds of financial institutions like the Reserve Bank of India, industrial development institutions, commercial banks, agricultural finance corporations etc., were visited (For list of institutions visited, see Appendix 1).

Place in the Institution

Out of the eleven institutions visited, only three had provided a separate department for the library in the organisational framework; in all the others, the libraries were attached to departments of economics, research or statistics. The librarian was directly responsible either to the chief executive or to a committee of senior officers. The library was thus controlled by an officer or a committee. Even in situations where the librarian reported directly to a very senior officer, he generally did not have any authority to take decisions regarding purchase of books and periodicals, appointment of library staff, acquiring furniture, etc. which were all controlled by higher authorities.

Budget

Unfortunately, because of different budget practices, it was not possible to calculate the percentage of the total institutional budget spent on the library. In three cases, the budget of the institution specially provided for the procurement of books and periodicals. Other items of purchases such as stationery, furniture, equipment, etc. were made centrally and there was no separate amount earmarked for the library. In the remaining eight instances no fixed provision was made even for purchase of books and periodicals. This was carried out as and when the need arose. Only if the amount exceeded Rs 10,000/- in one case, was sanction from the Board of Directors necessary. Obviously, a greater amount was spent on the purchase of journals than books; but it was not possible to arrive at an average proportional split-up between the two.

Collection

The book collection ranged between 700 and 60,000 volumes. Some libraries included bound volumes of periodicals in this total count, others did not. The collection was primarily on the subjects of interest to the institution, viz., Economics, International Economics, Monetary policy, Law, Labour, Politics, Commerce, Management, Industry, Agriculture, etc. It included encyclopedias, dictionaries, statistical yearbooks, handbooks, directories. A few books of general interest like bibliographies, art, history, current affairs were also included in the collection. In one case, recreational reading was provided for staff members through a separate library.

Besides books, the collection included periodicals, balance sheets and annual reports of companies, reports of similar local, national, and international institutions, project reports, census reports, tariff commission reports, report of government appointed commissions and committees, Government Gazettes, which were not counted as part of the total stock. The collection was rich and heavily used. Pamphlets, brochures, annual reports and periodicals of general interest were frequently weeded out.

Books and periodicals were usually selected by officers. The librarian assisted in the selection process by collecting reviews of books or preparing notes on each title. When books were received on approval from booksellers, the opinions of senior officers were solicited before placing the final order. It was noticed that in relation to academic libraries comparatively greater care was exercised in the utilization of funds.

The library collection - its quality, quantity and variety depended upon the officer in charge and his interest in the development of library.

Library Services

The worth of a library is reflected in the services it offers. These, in turn, depend upon the policy of the institutions and the space, staff and funds available.

All the libraries offered the basic services of reference and home lending. Reading facilities were severely limited because of shortage of space and the number of seats available ranged from nil to ten. Almost in all instances the library maintained up-to-date subjectwise newspaper clippings and pamphlet files. Another regular and important feature of the library was the routing of current periodicals to interested officers. In some cases indexes and abstracts of articles, documentation lists, lists of new acquisitions were prepared and circulated. In three cases besides the above-mentioned services, bibliographies were prepared both on the library's own initiative and on request from the readers.

The National Institute of Bank Management has also a data bank on Banking, Agriculture, Industry and the Indian Economy. Most of the data collected are from 1950-51 to date. The Indian Bank Association offers photocopying services on payment.

No formal plan of cooperation has been drawn up among these libraries of financial institutions. However, when the need arises, frequent inter-library lending of books and other materials takes place on the strength of informal contacts between the libraries.

Extent of Use

It was noticed that in only three financial institutions was the library used by all department and branches. In the others, the library's use was generally localized among departments of Economics Research, Statistics and Projects. Even among these departments it was observed by the librarians that those officers who had received their training abroad made comparatively great use of the library. Outsiders, including research students, made considerable use of three libraries. The library was used for providing material for keeping up-to-date as well as for retrospective information. The latter was generally factual rather than bibliographical. Hence visits to the library were less frequent than queries made over the telephone or through notes.

Staff

In all, except one institution, librarians were professionally qualified. In that case, an officer was designated as librarian. The staff varied from 1 to 19 members, depending upon the size of the library. These included semi-professional and clerical staff. Salary-wise all professionals were equivalent to junior or assistant officers.

Common Problems

Since the library usually relied on central clerical and typing facilities, production of bulletins, acquisition lists, periodical lists, indexes and abstracts were often delayed. Of the library's twin aims of meeting current and retrospective needs the former remained partially unfulfilled due to this delay. On the other hand, tools primarily prepared for current awareness had to be utilized for retrospective search.

Many a time unwanted personnel of other departments was shifted to the library. Frequent transfers of the semi-professional and clerical staff to and from other departments disturbed the continuity of the work in the library.

According to the librarians the severest problem was of space. This was partly due to lack of planning. Even the allotted space was frequently used to store unwanted material of other departments or for seating personnel belonging to other departments which were overcrowded. This acute space shortage resulted in the curtailment of reading facilities. Thus the library atmosphere was gradually eroded. The space problem was so critical that in one case books were stacked in the basement resulting in exposure to natural calamities.

Compared to other professional colleagues in academic libraries the librarian of a financial institution has no powers regarding his day-to-day work. This often creates a lack of interest in his work and results in a blinker attitude of just dealing with routine matters. He does not contribute to professional literature and discussions, but stagnates.

Remarks

There is a little doubt as to whether the libraries attached to financial institutions fulfill the objectives and functions to a great extent. However, there is ample scope for development and expansion of these libraries. To achieve this, it is recommended that attention be paid to careful planning, congenial organizational structure, selection of an enterprising librarian and establishing cooperative programmes with other libraries.

Careful planning right from its inception will sharpen the image of the library. Together with planning the location and space requirements of the library, its position in the organisational structure should be properly clarified. It is best to set it up as a separate department; placing the library within any other department often leads to the narrow interpretation that its services are meant for that department only. This hinders the creation of general library awareness in the entire organization.

The selection of an enterprising librarian will ensure the integration of the library with the institution's work. Such a librarian will have a general perspective of the financial scene and detailed knowledge of the organization and working of each department. He becomes an accepted member of the professional and managerial staff for he can understand and speak the language of business.
To bring about in the management a greater realization of the library's worth the librarian must maintain statistics regarding issues, data collected, current awareness lists, significant reference queries which would indicate at a glance the contribution of the library.

Importance of organized and comprehensive cooperative programmes between libraries would render help to all concerned, Inter-library lending, exchange of duplicates, preparation of union lists of periodicals and serial holdings would result in saving time and energy. Inter-library lending of books and other materials should be extended to academic and other specialized libraries. A cooperative venture of bringing out a bulletin on common problems and solution would be useful to all.

These recommendations and the earlier observations are made on the basis of visits to these libraries and talks with the librarians. It would be useful to examine in greater detail the range and depth of the individual collections and study the pattern of their use. Such studies of user needs and satisfaction can best be undertaken by the librarians of financial institutions themselves, either individually or as a group.

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APPENDIX I

LIST OF INSTITUTIONS

1. Agricultural Finance Corporation Ltd., Bombay
2. Indian Bank's Association, Bombay
3. Industrial Credit and Investment Corporation of India Ltd., Bombay
4. Industrial Development Bank of India, Bombay.
5. Maharashtra State Financial Corporation, Bombay
6. National Institute of Bank Management, Bombay
7. Reserve Bank of India, Agricultural Credit Department, Bombay
8. Reserve Bank of India, Economic Department Library, Bombay
9. Reserve Bank of India, Legal Department Library, Bombay
10. State of India, Bombay
11. State Bank of India, Head Office, Bombay.

ON TRANSCRIPTION AND TRANSLITERATION

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The exact meanings of Transliteration, Transcription, and Romanization are brought out. The necessity for a standard system of transliteration and some early attempts towards standardization are discussed. The advantages and disadvantages of two different systems of transliteration, namely, use of combination of characters and use of diacritical marks, are also discussed.

The problem of the Babel originated from the diversity of languages but the diversity of scripts has also its share in this problem in the modern context. The multiplicity of scripts, unequal number of characters in different scripts and the inability of the characters of an alphabet to represent the sounds of different languages are of concern not only to linguists but also to the librarians, documentalists and information scientists. Roman has 26 characters, while these vary from 40 to 30 in Cyrillic. Chinese has 1800 as everyday life characters. Another problem of the scripts is that with the change of time, some of the characters are dropped and new characters are added to some scripts. In Bengali the character ঌ (Li) has for all practical purposes been abandoned. Similar examples are also available in early and modern Greek, Cyrillic, Hebrew, etc. The ability of different scripts to represent sounds is also different. Tamil has not enough consonants. Siamese has a great range of vowel sounds. Arabic script has the problem of being non-vocalic. Hebrew, like Arabic, is a non-consonantal script with the option of using certain letters as metres lectionis to suggest vowels or vowel points [1]. The problem of conversion of personal names, place names, titles of publications, titles of contributions, etc. from one script to another has baffled all concerned and paved the way for solution evolving different processes of transliteration.

Transliteration, Transcription and Romanization

In order to assess the correct role of Transliteration, Transcription and Romanization let us examine the existing views. According to Shorter Oxford English Dictionary, Transliteration replaces (letters or characters of one language) by those of another used to represent the same sound [4]. According to Frontard [3], Transcription means shift of one mode of writing to another, in particular, from writing in one alphabet to writing in another. Transliteration consists in effecting this transcription, letter by letter. So, according to him, Transliteration is not opposite of Transcription, rather a part of it. Kent [2] has also dealt with this problem and according to him a clear distinction between Transcription and Transliteration can be made. Dr. Alois Şeveik of Czechoslovak Standard Association placed this problem categorically in a paper at the 17th International Conference on Documentation at Berne in 1947 and later at ISO TC/46 at the Hague in 1948. Mosley [5] also viewed this issue in a similar manner. According to him, Transliteration is like Orthographic equation. Letters are transferred from one script to the appropriate characters of another script and in Transcription sound of a foreign, or away language, using ideography, is reproduced by letters.

This juxtaposition role of Transliteration and Transcription is more accepted. According to this view Transliteration should have the following characteristics:

i) It is a question of representing characters and not phonetic sounds.

ii) It will be different from Transcription which is used for representing phonetic sounds.

iii) It should be automatic and can be done by anybody conversant with the language of the original.

iv) Re-establishment of the original should also be possible without causing any ambiguity.

v) Conversion should be uniform and consistent.

This conversion of characters may be from Roman script to non-Roman and vice-versa. The conversion of characters of non-Roman scripts like Cyrillic, Hebrew, Greek, Arabic, Chinese, Sanskrit, etc. into Roman is called Romanization. In English speaking countries Romanization or this aspect of Transliteration is of more importance.

The necessity of Transliteration

No country in the present world can live in isolation. Place names, authors' names and titles of contributions of one country are of interest to the other country. Of course, this interest will vary with the political, economic and technological developments of the individual country. Libraries and information centres, while preparing catalogues, indices and bibliographical lists of different languages, take the help of Transliteration.

Early attempts in Transliteration

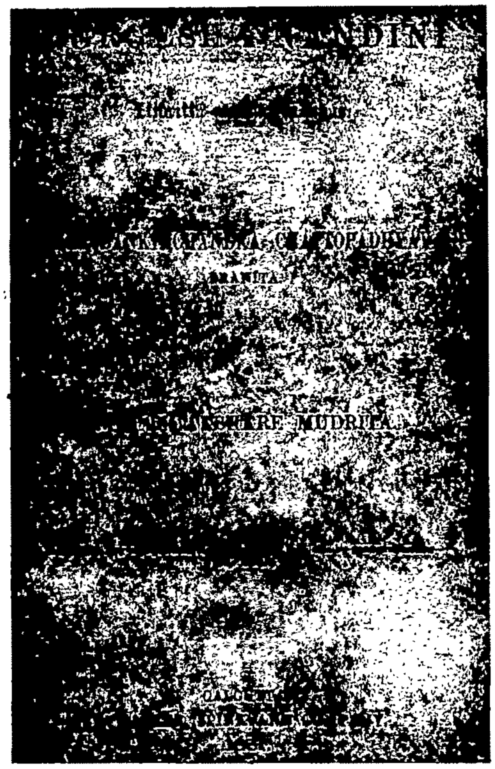
Early attempts in Transliteration and its standardization were made in the Library of Congress, British Museum, Government Printing Office, U.S.A., Geographical Board of America, etc. Early Romanization of Indian names and terms was carried out by the Asiatic Society of Bengal in the first half of the 19th century. The Journal of the Asiatic Society of Bengal (Vol I, 1832) carried a number of transliterated (or Romanized) Indian words like the following:

KACHÁR,
MANJÚSRI,
VIṢHṆU PURÁNA
NARÁYANA
QARÄ

Gleanings in Science (Vol I, 1829) also published by the Asiatic Society of Bengal carried transliterations like the following words:

RAMGANGÁ,
AIYÁR, etc.

But these are not pioneering attempts in Romanization of Indian scripts. Christian missionaries of the 18th century were the pioneers in this field. 'Kripar Shastrer Arthabhed' was published in Romanized Bengali in 1735 from Lisbon. The Gospel of St. Luke was another early Romanized Bengali book for which due credit goes to the Christian missionaries. In the 19th century, a movement for Romanization of Indian scripts, specially for Bengali, got some foothold. Roman Akshar Samaj and Roman Akshar Sabha were established in Bengal under the patronage of Pandit Mahesh Chandra Nyayratna of Sanskrit College, Calcutta and T.F. Brown, Sessions Judge, 24 Pargannas, Bengal. Sir William Jones, founder of the Asiatic Society of Bengal and Dr. Gilchrist devised a system of Romanization of Indian scripts, which was followed in many cases with slight modifications. Mr. Bandyopadhyay [6] has drawn the attention of scholars to a copy of the Romanized version of Durgesha-Nandini, a famous Bengali novel by Bankim Chandra Chattopadhyay, published in 1881. This was a result of the Romanization movement. This movement also touched the 20th century when a number of Urdu books were published in Romanized version under the auspices of Ramnarain Pal, a publisher in Allahabad. In 1935, a student desk dictionary containing English words and their Hindusthani meaning in Roman characters was also published by the same publisher.



The title page of Romanized version of the famous Bengali novel 'Durgesha Nandini' published in 1881.

অ=a, আ=á, ই=i, ঈ=í, উ=u, ঊ=ú, ঋ=ri, এ=e,
ঐ=ai, ও=o, ঔ=au, ক=k, খ=kh, গ=g, ঘ=gh,
ঙ=n/ṅ(১), চ=c, ছ=ch, জ=j, ঝ=jh, ঞ=n/ñ(২),
ট=ṭ, ঠ=ṭh, ড=ḍ, ঢ=ḍh, ণ=n, ত=t, থ=th, দ=d,
ধ=dh, ন=n, প=p, ফ=ph, ব=b, ভ=bh, ম=m,
য=j/y(৩), র=r, ল=l, ব=b/v(৪), শ=sh, ষ=sh, স=s,
হ=h, ড়=ṛ, ঢ়=ṛh, য়=y, ঃ=h(৫), ঁ=ṅ, ং=n

Diacritical method of transliteration followed in the Romanized version of 'Durgesha Nandini'.

Categories of Transliteration

In a very few cases, a single character of one script can be represented by a single character of another as the total number of characters differs from script to script. So, one-to-one relation of characters is not possible. In order to overcome this difficulty, characters are transliterated either with the help of combination of characters or by diacritical marks along with characters of known script. Representation of Cyrillic Щ by shch (English) and Schtsch (German) is an example of the first category. While representation of Devanagari श by Śa according to Huntarian system (followed in Indian National Bibliography) is an example of the second type.

Advantages/Disadvantages of the Systems

Problem in the diacritical method lies in the non-availability of diacritical signs in typing machines and in many printing presses. One of the reasons of delay in publication of I.N.B. is said to be due to this drawback. Recent trend of information handling by computer has also made this more difficult to adopt.

Combination of characters method is free from this type of difficulty, but one cannot be sure whether some adjacent characters have been used in combination or in separation. In the absence of this clarity, reconstruction of the original may not be easy and may lead to confusion.

The famous Russian author Yexob has been transliterated in the following ways:

CHEKHOV (English)
TCHEKHOFF (French)
TSCHECHOFF (German)
ČEHOV (Czech)

Again, transliteration of the same Cyrillic words has resulted in the following variations in Roman character due to characteristics of the languages.

SHCHEDRIN (English)
CHTCHEDRINE (French)
SJTSJENDRIN (Dutch)
SCHTSCHEDRIN (German)

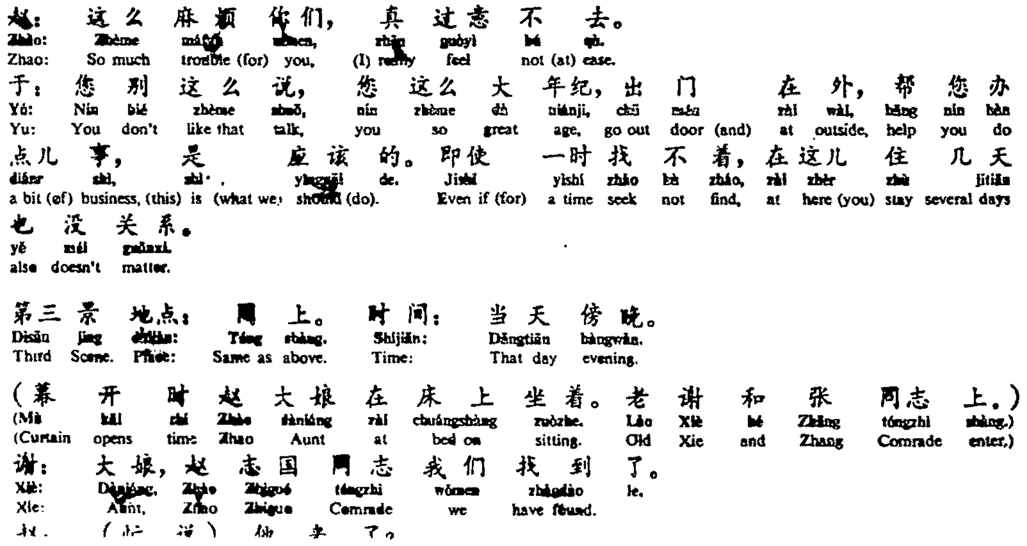
Here, the Cyrillic Щ has been taken care of by different combinations of Roman characters. If these characters are not considered together at the time of reconstruction, we may not get the correct Cyrillic character. All these may lead to loss of information during search as the same word will be placed in different places in alphabetical arrangement.

Standardization of the Process

This diversity, if we do not use the expression anarchy, naturally demanded the standardization of Transliteration process. The I.S.O. brought out various standards for Cyrillic, Arabic, Hebrew, Greek, etc. B.S.I. and A.N.S.I. have also published certain standards. Details of these standards along with the other systems of transliteration followed have been given in Appendix.

Conclusions

Like the Utopian idea of Esparento, functioning as universal language, a single script for all the languages is a rare possibility, though it is admitted that many countries like Indonesia, Vietnam, Turkey switched over to Roman script. Even in our country Romanized Hindi was suggested. Some tribal languages of eastern India are using the Roam script. In spite of all these developments the fact remains that the national sentiments in many countries will not allow large-scale Romanization of scripts. So the necessity and the problem of transliteration will remain as they are in the present and were in the



赵：这么麻烦你们，真过意不去。
Zhào: Zhème máfan nǐmen, zhēn guòyì bú qù.
Zhao: So much trouble (for) you, (I) really feel not (at) ease.
于：您别这么说，您这么大年纪，出门在外，帮您办
Yú: Nín bié zhème shuō, nín zhème dà niánji, chū mén zài wài, bāng nín bàn
Yu: You don't like that talk, you so great age, go out door (and) at outside, help you do
点儿事，是应该的。即使一时找不着，在这儿住几天
diǎnr shì, shì yīnggāi de. Jíshǐ yìshí zhǎo bù zháo, zài zhèr zhù jǐtiān
a bit (of) business, (this) is (what we should (do). Even if (for) a time seek not find, at here (you) stay several days
也没关系。
yě méi guānxi.
also doesn't matter.

第三景 地点：同上。时间：当天傍晚。
Dìsān jǐng dìdiǎn: Tóng shàng. Shíjiān: Dāngtiān bàngwǎn.
Third Scene. Place: Same as above. Time: That day evening.

（幕开时赵大娘在床上坐着。老谢和张同志上。）
(Mù kāi shí Zhào dàniáng zài chuángshàng zuòzhe. Lǎo Xiè hé Zhāng tóngzhì shàng.)
(Curtain opens time Zhao Aunt at bed on sitting. Old Xie and Zhang Comrade enter.)
谢：大娘，赵志国同志我们找到了。
Xiè: Dàniáng, Zhào Zhìguó tóngzhì wǒmen zhǎodào le.
Xie: Aunt, Zhao Zhiguo Comrade we have found.
赵：（惊喜）他来了。

Transcription of Chinese characters as followed in modern China
[Source: China Reconstructs]

past. Moreover, in the context of Unisist programme of global information network this aspect has already drawn the attention of the information scientists and will draw in future also.

Diacritical method of transliteration may yield to combination of characters method due to its unsuitability in typewriters and planographic process of printing.

Computers may be usefully employed in automatic transliteration. A suitable programme developed for this may identify the characters of different script scripts and may convert them to the required characters.

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APPENDIX

Scripts	Process of Transliteration	Publication where followed
Cyrillic	1) U.S. Board of Geographic Names.	1) Bibliography & Index of Geology
	2) ISO/R-9: 1955 (Revised 1968)	2) Index Translation vm
	3) B.S.-2979: 1958 (including Greek)	3) World Index & List of Translations notified to ETC
	4) British Museum Code	4) Union catalogues. INSDOC
Greek	I.S.O.R.-843: 1968 BSI-2979: 1958 (including Cyrillic)	
Hebrew	1) ISO R/259: 1962 2) A.N.S.I.	
Chinese	1) Pin Yin.	1) Bibliography & Index Geology
	2) Wade Gales	2) -do-
Japanese	Hepburn B.S.-4812: 1972	World Index & List of Translations notified to ETC
Arabic	ISO/R 233: 1961 B.S.I.-4280: 1968	
Indian	Huntarian	Indian National Bibliography

TECHNICAL INFORMATION: A REVIEW WITH REFERENCE TO SPECIAL STEELS PLANT

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Discusses the various types of information services that are necessary in the context of the Special Steel Plant of the Hindustan Steels Ltd. Certain measures required to extend the present services are also suggested.

1 ACTIVITIES

In a steel industry, particularly in a Special Steels Plant (SSP), dissemination of technical information is a complex function. The journal circulation work and individual notification for selective dissemination of information are not easy tasks. The area of such a plant is vast and its different departments, sections and units/cells are scattered all over this vast area. Because of this situation it is all the more essential that an information section should work more efficiently.

Technical Library and Information Section has to cater to the needs of a number of technical, scientific and other personnel including finance, administration, purchase and stores, who are participating in the activities of these plants. The processes and techniques used for making and shaping high quality high cost steel require a different concept and approach from that of an integrated plant making and shaping plain carbon steel. It is therefore natural that types and nature of information service in SSP should be quite different and specialized.

The information unit of SSP Technical Library has to:

i) answer on the spot queries/questions received over telephone and from persons visiting the library for the purpose;

ii) answer queries that require information from literature and its references;

iii) perform literature search;

iv) undertake exhaustive literature search;

v) prepare bibliographies;

vi) provide SDI service;

vii) prepare abstracts and publish Technical Abstracts Bulletin;

viii) arrange translation service; and

ix) provide reprographic service.

11 On-the-spot Queries

These queries are varied in nature and numerous. The enquirer may require immediate information on technical, specialized and general matters. Very quick answers are normally expected. Hence the Information Wing has to keep ready answers to certain questions in anticipation. At times answers are required to be given from memory. The technical and specialized queries are mainly on material standards, chemical compositions and definitions. The enquirers are to be given the answers or are to be referred to particular specifications and handbooks which are available in the Technical Library. For general queries references are generally made to various yearbooks and directories. The correct spellings of words, technical and non-technical, are also asked over phone and required to be given quickly.

12 Enquiries that require References to Literature

These are queries, answers to which are not kept ready and generally cannot be answered immediately, since these are different in nature from on-the-spot queries. References from more than one source are explored to get sufficient information for the purpose intended. Various house journals, bulletins, statistical handbooks and the like are referred to. At times enquirers are suggested to consult other technical libraries where the particular publication is known to be available.

13 Enquiries requiring Literature Search

There are certain enquiries, apparently very easy, that are frequently put to an information unit. Such enquiries relate to information on some technical matters which a reader faintly remembers to have seen in some publication in the library. To start with, the Information Wing tries to collect from the information seeker as much details as he remembers and then starts searching. Once a similar topic is found from any source, the reference is noted and the further citations in this reference are traced and searched. In this way it becomes easier to trace the particular reference and also to list other references on the topic. Though a bit time-consuming and laborious, the results are encouraging. A better system of indexing may help the Information Wing to deal with such problems.

Exhaustive Literature Search

Technical staff often needs references relating to a particular field of work it is concerned with. Information Wing within its limitations is to undertake the searching. To deal with such enquiry thorough knowledge of the work of the subject is required. These are usually concerning the work being done in the plant and also about the R&D projects being handled or taken up. Thorough literature survey about the required information is made and list of references prepared. Sometimes abstracts are also prepared. Information Wing is also to arrange for the collection of literature from external sources, when necessary. Collecting and collating information from external sources often save lot of time of the Information Wing since ready-made bibliographies on the topics of search are available. From bibliographies received from external sources further literature search is conducted internally. In this way exhaustive bibliographies on the field of interest are prepared and supplied.

15 Bibliographic Service

Bibliographies as and when prepared are kept in card index alphabetically as per selective keywords. References to journals, proceedings, reports, translations, company catalogues, etc. are cited and kept and can be referred to by the individuals when required. The users, however, are made aware of the terms that are used in the keyword list and are encouraged to frame their enquiry, as far as possible, in the appropriate keywords. The question should be precise so that the answers / references are clear and not ambiguous. It is useful to publish and circulate the bibliographical lists at least monthly so that the busy executives who find little or no time to come to the Technical Library can have a glance at the list and can request for the references of their interest.

16 Selective Dissemination of Information

In the technical information system 'Current Awareness Bulletin' for the technical staff and 'Individual Notification Method' for the top executives and for the R&D group should be introduced. Weekly Current Awareness Bulletin should include the abstracts of selected articles of interest of the technical staff and information about the changes in personnel and follow-up of the activities of other companies and organizations with which the firm has relations. Individual notification of items/matters of interest appearing in current journals, reports and books should be passed on immediately on receipt of it to the staff/executive concerned.

This individual notification is the base for SDI service. This service, if required, can be extended, depending on the staff strength of the Information Wing, to the technical and other staff who may be benefited from it. The feature of an ideal system is the issue, to each interested technical and other staff, with abstracts of articles/information that may ultimately benefit the company. This service undoubtedly increases the efficiency of technical staff.

The service including abstracting being time-consuming, it may not always be possible to cope with the ever-increasing demand of the technical staff. All possible service to R&D group, however, must be extended. But from the experience it may be concluded that to meet the demand of the technical staff it may be economical to employ extra staff member in the Information Wing.

17 Abstracting Service

Every Information Unit should publish, at least monthly, an information bulletin. This bulletin is to carry short summaries of articles of interest that have been published recently. Care should be taken see that most of the items of significance are not left out. In this bulletin latest innovations and technical advances of SSP's fields of interest are to be included. But for various reasons the Information Wing may not be able to satisfy its users to the fullest extent. In the information bulletin space is to be provided for news items that may be of general interest.

Scanning the documents and abstracting them are time-consuming processes, hence it is advisable to subscribe, for the library, index cards being published by the foreign publishers. Comprehensive abstract journals like the Metals Abstracts, Chemical Abstracts, etc. can also be subscribed. But since these abstracting journals have usually a time lag and are being received in India, due to long transit period, very late, the Information Wing is to depend, for quick dissemination, on their own abstracting service. Such abstracts should be precise and indicative. In general these abstracts should broadly indicate the title, author, and reference of the article/report and say what roughly the paper is about. It should be remembered that an abstract is neither a technical review nor it can substitute the original document.

18 Translation Service

Every information unit should have translation service facilities. Translation in English of relevant articles appearing in foreign language (other than English for us) journals should be quickly made and abstracted for inclusion in the SDI bulletin. Since every information unit cannot afford to employ its own staff for all languages, they have to depend mostly on other organizations. Apart from local facilities we require a national network of translation facilities. Regional translation service unit should be organized for better and quick service. Some foreign libraries and organizations also offer translation service on payment. Mention may be made of the British Library, U.K. and HBT Translations Service, USA.

19 Reprographic Service

This is one of the most important back-up services of any information unit. The techniques are numerous - micro-forming, reflex-printing, diazo-printing, xerography, etc. Every information unit should have at least one microfilm or microfiche unit along with one reader-printer and one xerox or a similar copier machine. Every Information Wing of Technical Library should provide such facility to its technical staff.

Modern methods of retrieval and dissemination of information involve the use of computers. This is very effective and useful for SDI. But for small technical libraries this is uneconomical and impractical. However, for every industrial belt, one centralised unit would be very useful.

CONCLUSIONS

From the foregoing discussion it may be seen that dissemination of technical information is a complex function. The complexity, however, is manifold in Special Steels Plants where many varieties of special and alloy steels are made and processed to exacting specifications. The Information Wings of the Special Steels Plants, whatever be their limitations, are to give answers to queries put by the technical and other staff who seek for it. These units are also to provide 'Selective Information' to the concerned technical staff, research personnel and also to the top executives. Since resources are in general limited, they have many bottlenecks which, however, they are to ovecome through extra activities and earnest efforts. For certain reasons, beyond control, all attempts may definitely be on a smaller scale. It has already been mentioned that it becomes necessary to collect information from external sources. But to utilize the outside sources of information fully and efficiently, personal contact with the staff members of those sources is essential.

It is seen that the technologists particularly the R&D group spend lot of their valuable time searching for relevant information. It is, therefore, desirable that information role should be studied properly, with a view to improving the service of the Information Wing.

Competence to satisfy the technical information seeker should be the first consideration for staff selection. Staff training is one of the most important criteria for efficient and effective service. But in most cases these are neglected. The staff member should also get service satisfaction from the joy blossoming on the faces of information seeker. With the cooperation of all including managing authority, extension of the area of service is possible and this service will be ultimately economical for the industry. It should be appreciated that information service has been, is and will

that information service has been, is and will be playing the most dominant role in any meaningful progress of the industry

ACKNOWLEDGMENT

The author is grateful to the General Superintendent and the Chief Metallurgiest of the Alloy Steels Plant for their kind permission to publish this paper. Thanks are also due to Shri M.K. Dutta, Chief Metallurgist for his kind encouragement.

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FOCUS ON UNISIST PROGRAMMES

PROPOSED GENERAL OUTLINE OF UNISIST PROGRAMME FOR 1977-1978

It is now possible to present a preliminary glimpse of some activities planned within the 1977-1978 UNISIST programme, --- as an integral part of a general Unesco information programme designed to achieve "development and promotion of information system and services at the national and regional levels".

The following sub-objectives, on which the entire Unesco information programme will be aligned, are based on the UNISIST programme objectives approved by the 17th and 18th General Conferences:

a) To promote the formulation of information policy and plans

Continued support will be given to Focal Points for co-ordinating national efforts in information and to UNISIST National Committees, to link these efforts with the UNISIST programme, thereby ensuring the active participation of Member States.

Efforts will continue towards the co-ordination of information activities and programmes at the world level, through the United Nations system and governmental and non-governmental organizations.

b) To promote the establishment and application of methods, norms and standards

The 'UNISIST Manual for Information Handling Procedures', to be developed by the UNISIST Working Group on Bibliographic Data Interchange, will be most important activity in this part of the programme. A first draft of the Manual should be available by the end of 1977 whilst testing is planned for 1978.

In co-operation with rational and international organizations and in particular with ISO, work will be undertaken to encourage the application of UNISIST guidelines and ISO norms and standards for improvement of systems interconnexion. Training courses and symposia will be organized and relevant studies will be carried out.

The International Serials Data System (ISDS) will be further developed. Additional national centres will be established and their relations with the International Centre improved.

In the field of scientific editing efforts will be continued in information quality control. Two regional meetings for scientific editors will be sponsored and guidelines for editors will be published.

A feasibility study is planned on the establishment of a world-wide terminology network in co-operation with INFOTERM; such a network might incorporate several UNISIST activities such as the Clearinghouse for thesauri at IINTE in Warsaw.

c) To assist in the development of information infrastructures

Two objectives from previous UNISIST programmes have been combined in the sub-objective: improvement of the institutional component of information transfer and assistance to Member States in the establishment and development of their information structures. The activities of this programme will contribute to the planning and development of scientific and technological information systems and data banks, promoting modern techniques, assisting developing countries to develop and establish their own information infrastructures.

A meeting of CAN/SDI users will be organized in co-operation with the Canada Institute for Scientific and Technical Information where the results of UNISIST pilot projects will be presented.

UNISIST will participate in the co-operative programmes on abstracting and indexing services, data banks and data referral centres, information analysis centres and information services on ongoing research.

d) To promote training and education of professionals and users

The aim of the programme is to assist developing countries to build up local facilities needed for the professional education and training of information manpower and to organize, where necessary on an international level, the training of managers, teachers, and specialists for national information systems.

The establishment of an international clearing system on training and education programmes in information will be encouraged, and an international fellowship pool will be created with other UN agencies, private foundations and international organizations to grant assistance to the developing countries for advanced study abroad in information science.

Courses and reorientation seminars for the training of teachers, managers, users and information specialists from the developing countries will be organized.

As part of the UNISIST contribution to improve assistance in national and regional training programme, further guidelines and curriculum material for training in developing countries will be published.

UNISIST CENTRE FOR BIBLIOGRAPHIC DESCRIPTIONS

The British Library has concluded a contract with Unesco to set up the UNISIST Centre for Bibliographic Descriptions. The Centre will be located at the British Library, Research and Development Department in London and will be responsible for distribution and maintenance of the UNISIST Reference Manual for Machine Readable Bibliographic Descriptions. The main objectives of the centre will be to:

a) maintain the manual, issuing amendments if necessary;

b) co-ordinate activity within the field of bibliographic description in the scientific and technical community;

c) stimulate an awareness of the value of the manual and to promote its use; and

d) make provision where appropriate for suitable education in the use of the manual.

The purpose of the manual is to define a format for the exchange of machine-readable bibliographic records between information systems. A minimum set of data elements to constitute an adequate bibliographic citation for most types of scientific and technical literature is defined. The manual is to be regarded as a specification manual for technical management and systems design staff to enable them to design individual systems so that files can be exchanged with other centres also using the Reference Manual format.

INTERNATIONAL CENTRE FOR THE REGISTRATION OF SERIAL PUBLICATIONS OFFICIALLY SET UP

To encourage international co-operation in scientific and technical information and, in particular, to establish and keep up to date a register of serial publications, the Unesco General Conference authorized the Director-General to set up an international serials data system (ISDS), as part of the UNISIST programme.

The French Government declared its readiness to host the International Centre for ISDS in Paris and to make a substantial contribution towards its running.

In November 1975, the Director-General invited Member States to participate in ISDS by setting up national and/or regional centres. Negotiations with the French Government resulted in the establishment of the International Centre for the Registration of Serial Publications under an agreement signed on 14 November 1974 between Unesco and the French Republic.

This agreement also concerns the statutes of the International Centre and lays down the structure and the principles governing the operation of ISDS.

The Government of the French Republic gave its approval to the agreement on 21 December 1975; the agreement thus came into force on 21 January 1976 and the Centre came officially into existence.

BOOK REVIEWS

Bibliography in theory and practice. 2nd rev. & enl.ed., by M L Chakraborti. Calcutta, World Press, 1975. xv, 448p. [Reviewed by B K Sen]

As is evident from the citation given above, this is the second revised and enlarged edition of the book published in 1971. The present edition contains all those chapters that were present in the first edition, besides the chapter on 'Documentation' which is a new one. The first chapter deals with the definition, history, types, aims and functions, etc. of bibliography. Writing materials; paper and kinds of writings, scripts, etc. have found place in chapters II-IV. Various aspects of printing including illustrations have been dealt in chapters V-VII. The chapter VIII is entirely devoted to binding. Chapters IX - X are respectively on the structure and collation of books. Bibliographical frauds, authenticity of an edition, and editing have been described in a single chapter (i. e. chapter XI). The next four chapters (XII-XV) dwell respectively on bibliographical description, systematic bibliography, other bibliographies and their techniques of compilation and bibliographical organisation. The last chapter XVI is on documentation.

From the preface to the second edition, it appears that a few chapters of the book 'have been entirely rewritten in order to make it comprehensive' and that the first edition of the book was sold out in the course of just two years and a half. The fairly quick selling of the first edition is indicative more than anything else, of a gap long existing in the Indian library science publications, which has been discovered and judiciously filled in by the author. The book is adapted to be used as a textbook for certificate and B.Lib.Sc. courses in Indian universities, by including within its covers all those aspects of bibliography, with emphasis on Indian subjects, that are usually taught in Indian universities.

Even though the book is running through its second edition, yet factual, grammatical and printing mistakes are frequented at fits and starts. As it is neither possible nor desirable to put down all the mistakes within this brief compass, only a few of them are discussed here. Statements like 'The business of bibliography... is to show what books have been written and published on a given subject and how far knowledge has been unfolded in it. That is to say, bibliographies thus deal with the whole field of book knowledge' (p.25); 'Bibliographies primarily list books currently published' (p.26) only betray author's utter ignorance as to the content of present-day bibliographies. Even a casual look at the overwhelming number of bibliographies emanating from various parts of the world both in the form of books and periodicals reveal that the bibliographies list mostly periodical articles. The number of bibliographies listing only books or mostly books is extremely small. There are also bibliographies that list only periodicals articles, or unpublished reports, or standards or patents and so on, about which the author is silent. While differentiating between a catalogue and a bibliography, the author states 'Bibliography can be issued to the readers but catalogues cannot' (p.76). Can't a printed catalogue be issued? It may be pointed out here that All Union Institute of Information and Techno-economic Studies on Agriculture, USSR maintains the bibliography of entire world literature of agriculture in card form, which cannot be issued. The above sentence within quotes and many others are indicative of the author's natural tendency of omission as well as unnecessary insertion of articles. The author has a special weakness for the word 'but' and the phrase 'at once', which will be evident from the following sentences. 'Bamboo is largely used in India for manufacturing paper. But as its fibres are short and brittle no good paper can be made from it. But manilla which has fibres at once long and strong can produce really rough papers'. The sentences, needless to say, read much better without 'but's and 'at once'. While describing the Indus Valley script, the author does not make any mention above the claim of deciphering of these scripts by a group of Finnish Workers (S. Parpola & others), at the Scandinavian Institute of Asian Studies, Copenhagen, which is a clear-case of omission. The reading list entitled 'Early Printing in India' does not reflect Priolkar's 'Printing press in India'. The omission of A.K. Das Gupta's 'An essay on personal bibliography' in the section

'Personal Bibliography' (P. 267-8) is really surprising.

Now, let us dwell on the chapter Documentation. The author has found it difficult to define documentation as he has found the definition offered by various authorities 'not only vague but often confusing'. In the quest for definition, the author has searched documents of more than two hundred years starting right from 1754. If the definitions of a subject, let it be physics, economics, statistics, or any other, that were prevalent during the last 200 years or so are gleaned together and analysed, it will be found that many of the definitions are not only confusing but even contradictory to one another. In any fast developing subject, definitions are bound to change. A definition offered to day may be totally obsolete a few years hence. Besides, the definition of a subject, which may be crystal clear to a man of that discipline, may prove to be Greek or vague to a man of another discipline. Endeavouring to decide the status of documentation vis-a-vis librarianship, the author has arrived at a funny conclusion that documentation is nothing but a special kind of reference service. Documentation, though developed as an offshoot of librarianship, has undeniably established itself as a full-fledged discipline, which should be acknowledged and viewed from a dispassionate angle.

The expression 'journals and periodicals' appears several times. As there is hardly any difference between a journal and a periodical it is better to use either of the two terms, serials may also be used, that would include irregular periodicals also. The total number of periodicals in the field of natural science today is not 50 thousand as stated (p. 405). The number will be far less since the total number of currently published scientific and technical periodicals is about 40,000. The International Institute of Bibliography was renamed as International Institute of Documentation in 1931 and not in 1924 as stated in the book (p. 408). While discussing indexing and abstracting, the author has categorised Engineering Index as an indexing periodical, (p.413) which is wrong. It is an abstracting periodical. Various types of computerised indexes like KWIC, KWAC, KWOC, BASIC, PRECIS, etc. that have come into use in recent years have not been mentioned at all. Neither there is any mention about thesauri and its compilation. The topic 'abstracting' has been discussed without the mention of a single word about the technique of abstracting.

Translation services discussed in 27 lines contain more words than substance. Neither there is any mention about the translating agencies like Consultants Bureaus, European Translation Centre, etc., nor there is any mention about the tools of translation, nor there is a line about the bibliographic control of translation by national and international agencies.

While discussing about INSDOC the author fallaciously mentions that INSDOC is housed in the National Physical Laboratory. In fact, INSDOC is functioning in its own house since 1964. The Information regarding INSDOC is rather scanty. The Union Catalogue Project, one of the largest bibliographical projects, that has been ever been taken in India, has not been mentioned. There is also no mention about Russian Science Information Centre and its two periodical publications, i.e. Contents List of Soviet Scientific Periodicals, and Russian Scientific & Technical Publications - an Accession List.

Apart from this, the author has remained totally silent about the documentation aspect of unpublished materials like theses, dissertations, unpublished reports, and so on. So is the case with the computerisation of various documentation processes.

Now let us have a look at the Reading List provided at the end of each chapter to find out how an experienced lecturer of bibliography has tackled the trickish task of bibliographical rendition. Here, possibly, it will not be too much to say that the author has made a mess of the whole thing. If one has to find a mine of incompleteness, inaccuracies and inconsistencies in respect of bibliographical citations, then here is the book. The edition statement has almost invariably found place with imprint. The spelling of Chambers's in the case of 'Chambers's Encyclopaedia' was obviously not known to the author, neither did he bother to verify, instead he went on experimenting with it using all possible variants like, 'Chamber's (P. 27), Chambers's (p. 51), Chambers' (p.73) and so on. In a large number of cases, entries are incomplete. In the Reading List (p.50-1), out of 17 entries, as many as 9 are without imprint. Lack of consistency is the speciality of the book. The Oxford University Press has been rendered as Oxford University Press (p.27), O.U.P. (p.170), and OUP (p. 257). The Association of Assistant Librarians as Asso. of As Asstt. Librarians (p. 219), Assn. of Asst. Librarians (p. 219); and Association of Assistant Librarians (p. 256), etc. Sometimes the titles of publications have been put in romans (3rd to 5th entries, p. 27), and sometimes in italics (p. 51) and sometimes partially in italics and partially in romans (3rd entry, p.431).

The printing errors, factual fallacies, grammatical mistakes, stylistic aberrations, etc. in chapters other than Documentation do not prove to be more than minor blemishes and as such do not reduce the value of the textual matter of those chapters to a reckonable degree. However, all the chapters in general and 'Documentation' in particular need thorough editing before any further edition is brought out.

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contents

Pages

KUMAR (S K) and KAMATH (V A)

Access to World Bibliographic Data Bases and ESRIN/RECON On-line Demonstration in India 205-12

GUHA (B), SEN (B K) and NEOGI (R N)

On Change of Titles of Periodicals, pt. 4 413-22

KASIVISWANADHAM (S) and RAIZADA (A S)

CHEM/SDI Profiling 423-34

SHETH (Tara)

The Libraries of some Financial Institutions in Bombay 235-37

CHAKRABORTTY (A R) and CHAKRABORTTY (B)

On Transcription and Transliteration 238-41

BASU (A K)

Technical Information, a Review with Special Reference to Special Steels Plant 242-44

FOCUS ON UNISIST PROGRAMMES 245-46

BOOK REVIEW 247-48

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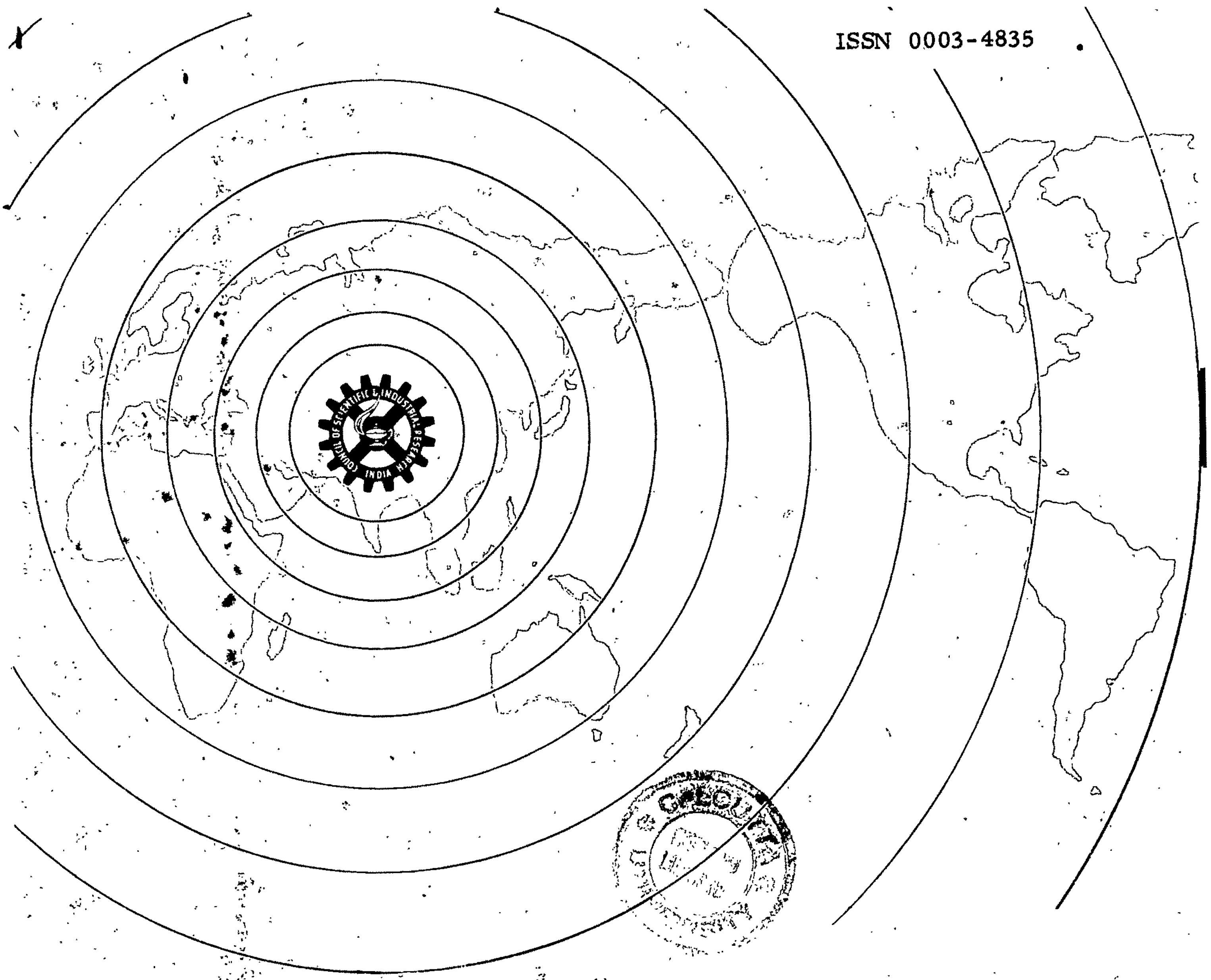

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1876

The Centennial

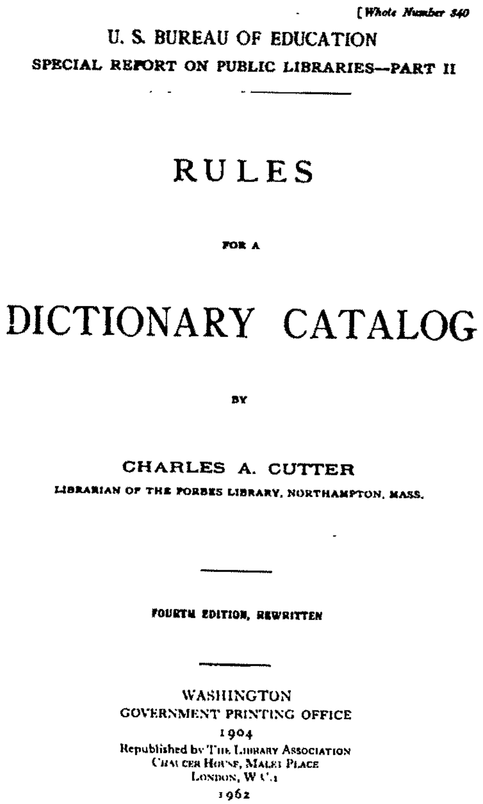
of

Cutter's Rules

and

Dewey Decimal Classification

1976



[Whole Number 340

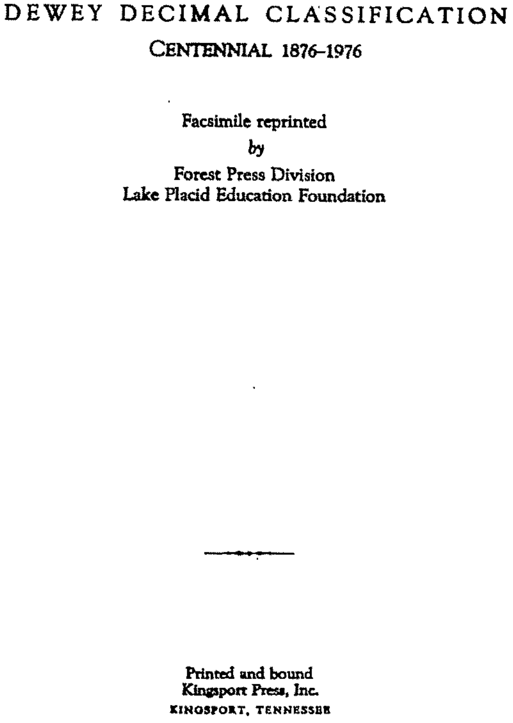
U. S. BUREAU OF EDUCATION
SPECIAL REPORT ON PUBLIC LIBRARIES—PART II

RULES
FOR A
DICTIONARY CATALOG
BY
CHARLES A. CUTTER
LIBRARIAN OF THE FORBES LIBRARY, NORTHAMPTON, MASS.

FOURTH EDITION, REWRITTEN

WASHINGTON
GOVERNMENT PRINTING OFFICE
1904
Republished by THE LIBRARY ASSOCIATION
CHAUCER HOUSE, MALET PLACE
LONDON, W.C.1
1962

Title page of the fourth and final edition of Cutter's Rules published posthumously in 1904.



DEWEY DECIMAL CLASSIFICATION
CENTENNIAL 1876–1976

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Title page of the facsimile reprinted first edition of the Dewey Decimal Classification published in 1976. A review appears in page 275.

EDITORIAL:

HUNDRED YEARS OF CUTTER'S RULES AND DEWEY DECIMAL CLASSIFICATION

Hundred years is quite a long period in the development of any subject field. New ideas and new knowledge accumulate faster with the progress of a field and they in turn introduce new practices, better techniques, and above all fundamental principles. The field of library science or the information field, in general, has not been an exception to this general rule. It too has progressed considerably. Hundred years ago, one could hardly think of canons of cataloguing, theory of classification, fundamental categories, faceted classification, data bases, SDI services and so on which are quite common place ideas in the library field. In spite of such progress, the ideas and contributions of some minds are always found to be dominating in a field. Names of such persons become part of the subject in which they practice. Charless Ami Cutter and Melvil Dewey are surely two such names in the field of library science and the two contributions are the Rules for a Dictionary Catalog and the Dewey Decimal Classification. Before the year 1976 runs out, it would be most appropriate to recall that the year marks the hundred years of publication of these two great works.

Commenting on Cutters' contributions, J P Immroth has said, 'he is the only American librarian, if not the only librarian, to have his surname accepted in verbal form as a part of the language or at least as a part of the library science jargon'. Immroth, of course, was referring to the particular book numbering system which has attained the eponymic fame of Cutter Number. Almost in the same way Melvil Dewey's name also is permanently impressed in the eponymic name of the most widely used classification system, that is, the Dewey Decimal Classification (DDC). Truely, the sun never sets on the DDC! Both Cutter and Dewey were many-faceted personalities. The present generation of librarians, however, remember one as the most important catalogue code maker and the other as the most important classificationist. Perhaps, future generation also will remember them alike for these contributions.

Cutter's Rules for a Dictionary Catalog and Dewey's classification scheme (A classification and subject index for cataloguing and arranging the books and pamphlets of a library) were both published in 1876. In 1876, the United States of America reached its hundredth years as a nation. The Centennial Exposition year saw the publication of a comprehensive report entitled 'Public libraries in the United States of America'. Cutter's Rules and portions of DDC formed part II of this report. The idea behind this report and a number of other publications and activities in that year was to demonstrate to the world the phenomenal growth of the country in various fields, including education and libraries. The inclusion of the Rules and the DDC in such an important national report show how important they were considered to be and also the high esteem in which Cutter's and Dewey's ideas in library matters were held.

Dewey's scheme, however, had made an anonymous appearance in the same year in the garb of a slim 44 page volume. But the impact was such as is known, that the scheme had to go through several editions even before the close of the century If Cutter's rules were based on the experience of cataloguing the rich collections of the Boston Athenaeum library, Dewey's scheme was similarly based on his experience in the arrangement of the collections of another important American library, namely, the Amherst College library. The scheme was designed in 1873.

It is said that due to his fraility and myopia it was decided by his parents that Charles Cutter should become a clergyman. To equip him for such an assignment, his plan of education was, naturally, to enter the Harvard Divinity School ultimately, through the Hopkins Classical School and the Harvard College. Even when a student at the Harvard Divinity School, Cutter was offered the post of librarian of the school, in 1858, which he accepted. Here he prepared a new catalogue for the school's collection. In 1860, he was appointed as an assistant librarian in the Harvard libraries. Here also Cutter had to involve himself with the preparation of a catalogue. Again, from 1865 to 1867 Cutter edited the printed book catalogue of the Prince Library of the Boston Public Library.

Thus, library work and mainly preparation of library catalogues consistently drew Cutter away from his chosen ecclesiastical path and he, inturn, was to change the course of library cataloguing to a considerable extent. The cataloguing assignments that have been mentioned above were not all that Cutter had to take up. They provided him the insight and knowledge with which one could embark on the biggest catalogue of his time. This was the dictionary catalogue of the holdings of the Boston Anthenaeum, "a work which in 1874 stood almost alone among American bibliographical undertakings so far as magnitude and thoroughness were concerned".

Cutter came to the Boston Athenaeum in January 1869. It is said that in order to prepare the Athenaeum catalogue in a systematic way it was necessary to write down a set of rules and guidelines. This Cutter did in 1875 which formed the basis of his Rules. The first edition of this work was just in 44 pages. In the Prefatory Note to the first edition, Cutter very modestly stated, "It is to be expected that a first attempt will be incomplete, and I shall be obliged to librarians for criticisms, objections, or new problems, with or without solutions. With such assistance perhaps a second edition of these hints would deserve the title - Rules".

Thus, the cataloguing code, which was to dominate the field for over a century, was presented to the profession as mere 'hints'. The specific task to which Cutter addressed himself in the framing of the Rules was 'to set forth the rules in a systematic way or to investigate what might be called the first principles of cataloguing'. This was an important task. Cutter had before him the correct perspective of rules in cataloguing practice. He made it clear by saying, in the Preface to the fourth edition, "Cataloging is an art, not a science. No rules can take the place of experience and good judgement, but some of the results of experience may be best indicated by rules".

Each of the prescriptions in the Rules is based on rich experience that Cutter gained in the preparation of the various catalogues, especially the Boston Athenaeum catalogue. It may be recalled that this five-volume catalogue included as many as 90, 000 books of the library listed in 3402 pages of double column format. One could hardly get better experience in cataloguing than compilation of such a catalogue. Cutter has only passed on his experience in the form of rules. That explains why the Rules have exerted such profound influence on the successive generations of cataloguers everywhere. Very truly Paul S Dunkin has said, "This remarkable book did not, like Athene, spring full-grown from the head of Zeus. It grew out of man's experience over many centuries in the making of catalogs. It grew out of Cutter's own experience in the making of catalogs, particularly his experience with his great dictionary catalog of the Boston Athenaeum."

Apart from the brilliant radiance of rich and varied experience which Cutter could lend to his Rules, there are some other remarkable characteristics of the code. The elaborate notes with most of the rules form an important part of the code. These notes along with the rules give a complete view of the catalogue that the code maker had in mind. What is remarkable is that an user of the code is bound to get the impression that Cutter had very correctly anticipated all the difficulties and doubts that one was likely to face.

A book of rules is usually a flat and uninteresting reading compilation. But Cutter's Rules is a rare exception. It is not only fascinating reading but one can feel the beat of a delicate human pulse behind most of the rules and the notes. One could hardly expect to find such pronouncement of wisdom in any catalogue code, as the following: "In the matter of titles an Englishwoman in marrying has everything to gain and nothing to lose. If she marries above her own rank she takes her husband's title in exchange for her own, if below her own rank she keeps her own title". This is the rule 214 of Cutter. The omission of the initial article in title was recommended, in rule 224, if it could be done "without altering the sense or too much offending the ear", To bring out the subtle alteration in meaning that may be caused by the omission of the initial article, Cutter had choosen just two simple examples and put them with his characteristic humour. He says, "... the meaning of 'Christening' and 'The Christening' is slightly different, and 'Kiss in the dark' might be taken for an injunction, whereas 'A kiss in the dark' is evidently only a title".

On the question of abridgement of titles all the codes do provide some guidelines. In the AACR, the guideline is mainly contained in rule 133B which reads, "Long titles are abridged if this can be done without loss of essential information". What Cutter said on the same point was much more penetrating and has become almost classic. Even S R Ranganathan, in his own Code, thought it wise to quote Cutter. The relevant portions of this celebrated rule 223 are as follows: "Many a title a yard long does not convey as much meaning as two well-chosen words. No precise rule can be given for abridgement. The title must not be so much shortened that the book shall be confounded with any other book of the same author or any other edition of the same book, or that it shall fail to be recognized by those who know it or have been referred to it by title, or that it shall convey a false or insufficient idea of the nature of the work and (under the subject) of its theme and its method of treating its theme".

To bring out the penetraing effectiveness of Cutter's rules and comments, let us highlight one more fascinating reading note which has also become a classic. This note also brings out the fact that Cutter was as much concerned with the catalogue as a whole as the making of the entries in it. The syndetic property of a dictionary catalogue has hardly been explained in a better way than in this note, which follows rule 186. It says, "... The dictionary catalog... having attained the object - facility of reference - is at liberty to try to secure some of the advantages of classification and system in its own way. Its subject-entries, individual, general, limited, extensive, thrown together without any logical arrangement, in most absurd proximity..., are a mass of utterly disconnected particles without any relation to one another, each useful in itself but only by itself. But by a well-devised net-work of cross-references the mob becomes an army, of which each part is capable of assisting many other parts. The effective force of the catalog is immensely increased".

Perhaps, many cataloguers and theoreticians will agree with L Jolley, who said, "No writer on cataloguing can fail to owe much to Cutter who, if he often fails to propose the correct solution, almost always shows that he has glimpsed it".

If Cutter had plans to become a clergyman, Melvil Dewey had planned to become a foreign missionary. Eventually he decided to remain in the field of education. Education had a wider connotation for Dewey. Libraries, techniques of librarianship, promoting library interests, training of librarians, etc. all formed part of education.

Even before his graduation, in 1874, Dewey began work in the Amherst College library as a student assistant. Even a brief aquintance with library work was enough to convince him of one thing that the usefulness of most of the libraries could be increased with slight modifications. Introduction of a better system of classification was surely an importance modification. In the Preface to the first edition of the scheme Dewey wrote, "It was the result of several month's study of library economy as found in some hundreds of books and pamphlets, and in over fifty personal visits to various American libraries. In this study, the author became convinced that the usefulness of these libraries might be greatly increased without additional expenditure. "Three years ~~practical~~ use of the system here explained, leads him to believe that it will accomplish this result; for with its aid, the catalogues, shelf-lists, indexes, and cross-references essential to this increased usefulness, can be made more economically than by any other method which he has been able to find."

It is significant that to improve the libraries a classification and subject index was considered so important by Dewey. However, one important question that has been asked before and will be asked again and again is what exactly has accounted for the phenomenal success of the scheme? The answer is, perhaps, largely available in Berwick Sayers observations wherein he says, "Its cardinal virtues are universality and hospitality, a simple expansible notation which is now almost an international classification vocabulary, excellent mnemonic features and an admirable index".

A lot can be said on each one of the virtues mentioned above on the basis of the general theory of classification that has now been developed. When Dewey devised his scheme, the libraries and the world of books were quite different and our knowledge of classification rudimentary. Simplicity of notation must have been the most attractive feature of the scheme then as it is to-day. This is an aspect on which Dewey himself had given considerable attention. How the idea of Arabic numerals as decimals came to his mind was revealed in an article-memoir published in 1920. Dewey wrote:

"... The first essential of the solution must be the greatest possible simplicity. The proverb said 'simple as a, b, c,' but stil simpler than that was 1, 2, 3. After months of study, one Sunday during a long sermon by Pres. Stearns, while á look to stedfastly at him without hearing a word, my mind absorbed in the vital problem, the solution flasht over me so that I jumpt in my seat and came very near shouting 'Eureka'! It was to get absolute simplicity by using the simplest known symbols, the arabic numerals as decimals, with the ordinary significance of nought, to number a classification of all human knowledge in print; this supplemented by the next simplest known symbols, a, b, c, indexing all heds of the tables, so that it would be easier to use a classification with 1000 heds so keyed than to use the ordinary 30 or 40 heds which one had to study carefully before using".

The above passage has a number of points to ponder and, in fact, contains many more things than meet the eye. Dewey was looking for an instrument which would help the librarians in doing away with the then prevalent practices of classification, cataloguing, shelving, charging, etc. He had also in mind that this instrument will have to be used by 'those with little skil or training', as he found the librarians to be. To appreciate Dewey's originality we must recall that in most libraries the prevalent practice was to earmark certain areas of the library to different subjects, about 30 or 40 heads, as Dewey said. The books in each of these areas were arranged by accession numbers and each book was given a shelf mark which identified its exact position, that is, the area or room, bay, tier, shelf, and place on shelf. This meant a new book on a subject could be accommodated only at the end of the collection in that subject and each book had a fixed location in the library. Any change or reshuffle in the arrangement of the collection, necessarily meant reclassification, that is, change of shelf marks, and recataloguing.

Dewey voiced his dissatisfaction with the above mentioned practice by saying "... I was astounded to find the lack of efficiency, and waste of time and money in constant recataloging and classifying made necessary by the almost universally fixt system where a book was numbered according to the particular room, tier, and shelf where it chanced to stand on that day, insted of by class, division and section to which it belonged yesterday, today and forever". In the context of the above mentioned strongly entrenched practice, Dewey introduced two new ideas, firstly, the use of notation for the subjects in his scheme, and applying the notation to the books and not the shelves. Both the ideas were revolutionary and both of them could be realised by the use of the classification scheme.

Introducing the first edition, Dewey very proudly said, "...'the number of a book shows not only where it is but what it is". In the Introduction to scheme that was given in special report entitled Public Libraries in the United States of America (1876), Dewey brought out the merits of the scheme in the following words:

> "Compared with other systems it is less expensive; more easily understood, remembered, and used; practical rather than theoretical; brief and familiar in its nomenclature; superior to all others in arranging..., and in indexing; susceptible of partial and gradual adoption without confusion; more convenient in keeping statistics and checks for books off the shelves; the most satisfactory adaptation of the card catalogue principle to the shelves. It requires less space to shelve the books; uses simpler symbols and fewer of them; can be expanded without limit and without confusion or waste of labor on both catalogue and shelves...; is unchangeable in its call numbers, and so gives them in all places where needed, as given in no other system; in its index affords an answer to the greatest objection to classed catalogues, and is the first satisfactory union of the advantages of the classed and dictionary system".

The long list of merits drawn by Dewey, as quoted above, can be appreciated only against the background of prevalent practices that have been mentioned earlier. Some of the points mentioned above need emphasis. Dewey had explanations for each of the merits claimed for the scheme. First of all, on the question of theoretical fineness and practical utility, it is known that Dewey had based his main classes on the classification system of Bacon but after that his main interest was on practical utility. Elaborating this aspect he wrote in another context:

> "My opinion grows stronger that it is a mere waste of time to attempt any scheme that will be filosofically satisfactory to more than the maker. The practical thing is to put every book on the same subject in the same place, and to be able to find it with speedy certainty when wanted. With such a scheme, based on utility rather than theory, I should be willing to risk survival against the more learned productions of the filosofers. Libraries need a practical working scheme, and can ill afford to tinker it here and there to secure what seems to the tinkerer important improvements".

The above extract clearly brings out Dewey's conviction of what he considered practical. Looking at it from this distance in time, there is hardly any doubt that this has given the greatest strength for the survival of the scheme. A practical shceme, such as the DDC has survived while a few theoretical schemes, based on stronger philosophical foundations, have gone into oblivion. DDC has been able to accomodate increasing amounts of detail in its subsequent editions in response to needs of documents and users. Even then the original structure remains the same.

In Dewey's elaboration of the merits of the scheme, as quoted earlier, considerable emphasis has been given on the quality of hospitality and 'adaptation of the card catalogue principle to the shelves'. A few words need be said on this aspect. As is known, the card catalogue had come into existence at that time. The immense flexibility of this form of catalogue was revolutionary in concept and the entire library world had absorbed the idea. Dewey wanted to bring home the point that his scheme, with decimal notations, could provide the same facility in the matter of shelving of books. Very enthusiastically, he said in the Preface to the first edition, "As in the card catalogue system, there is room for indefinite expansion without devices or provisions. Space is the only requisite and if the shelf room is exhausted, the floor space is equally good, except for the inconvenience of stooping".

Again, in the same paragraph, Dewey highlighted also the Subject Index, which subsequently was changed to Relative Index. Indeed the index was an important innovation. Compared to the usual forty or so headings upto which any library could go, about 1000 classes readily provided by the scheme was something which was beyond immediate comprehension. This was surely very much detailed subject specification. Some librarians opposed this excessive specification by saying that it would become difficult to find out a particular class of books. The Index was meant to overcome this problem. Dewey said, "Some prominent opponents of classed catalogues have admitted that the Subject Index, in deciding where to class a book at first, and where to look for it ever afterwards, has removed their strongest objections. Certainly it would be impossible to make an index more cheaply or more easy of reference, it being a single alphabet, of single words, followed by single numbers".

The implication of the second part of the quotation will be fully appreciated when we remember that Dewey wanted the Index to be used not only by the classifier for locating a class quickly but also by the cataloguer in the preparation of the subject catalogue of the library. If only the relevant entries in the Index were transferred into cards, a reliable set of class index entries could be obtained. It may be pointed out that the entries in the Index were much more detailed than the classes in the schedule.

EDITORIAL

It is significant that Dewey himself edited only the first three editions, from 1876 to 1888. From fourth to tenth editions the editor was May Seymour and then came Jennie Dorkas Fellows. This policy must have contributed considerably to put DDC on a more permanent footing.

Replying to Perkins and Schwartz, in the great Duet controversy, Dewey had remarked, "As a rule, the world cares but little for the man who first brings it a labor-saving device and makes it go, and cares practically nothing for the one who happened to think of it, or something like it, or tried it..." Surely, the world has not applied this rule in the case of Cutter and Dewey. Even after one hundred years of publication of the two great works, the world cares as much for their contributions as they were cared for by their contemporaries. For us, the Indian library community, it is specially gratifying that we shall have the Hindi adaptation of the DDC, for the first time, in the centenary year.

B. Guha

A TWENTIETH CENTURY ASSESSMENT OF CUTTER'S CODE

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1 Introduction

Cutter's Rules for a Dictionary Catalog (Rules) was published hundred years ago in 1876. The code was revised three times. The fourth and final edition was published posthumously in 1904. The Library Association reprinted this edition in 1931. Cutter himself had done the revision and had also written a three-page Preface to it. Ideas from this celebrated Preface, as is well known, are even now quoted. So profound are those ideas. Cutter's reaction to the introduction of the Library of Congress printed catalogue service is permanently impressed in those celebrated sentences in the Preface as "... the golden age of cataloging is over, and that the difficulties and discussions which have furnished an innocent pleasure to so many will interest them no more. Another lost art".

2 A guiding principle in implicit form

The same Preface also contains an important guiding principle clothed in such simple words as only Cutter could provide. He wrote "the convenience of the public is always to be set before the ease of the cataloger. In most cases they coincide" Perhaps, one can see an implicit form of the Canon of Sought Heading in this statement. It is evident he himself was guided by this principle or canon in the framing of the rules.

3 No abatement in interest

Even after more than seventy years of publication of the fourth edition of Cutter's Rules, one thing appears to be certain that the difficulties and discussions of cataloguing continue to interest and furnish the same innocent pleasure to many of us as they did in the days of Cutter, in spite of many changes that have come into the scene. The difficulties and discussions through which we had to pass to arrive at the stage of the Anglo-American Cataloguing Rules (AACR, 1967) and the further discussions and debates in the subsequent years amply display our abiding interest in the subject. This interest was kindled by Cutter.

4 Influence of Cutter

What is of more consequence here is that our interest in Cutter's Rules has not diminished at all. All the later cataloguing codes have drawn heavily upon Cutter. Hence, in the proper understanding of some of the modern rules and the logic behind them, we have to fall back on Cutter. It may be recalled that Cutter provided some excellent commentaries on the rules he recommended in his code. Some of the Rules have been so profound and fundamental that they are accepted even to-day as providing the best approach to certain situations or for types of documents. We shall be discussing, in the rest of this paper, some of the basic rules of Cutter with those of the AACR and also try to see their gradual evolution through the Cataloging Rules (CR) and the ALA Cataloging Rules for Author and Title Entries (ALA Rules).

It should be realised that Cutter's Rules was a complete catalogue code. It provided the necessary rules for the choice, rendering and style of writing of author and title entires and also provided rules for subject entries, cross references, and arrangement of entries. The code took note of different types of documents also. As is known, later developments in code making, such as the Cataloging Rules (1908), ALA Cataloging Rules (1947), and the AACR (1967), have the focus on author and title entries. Developments in subject cataloguing has been proceeding along independent lines. Hence, Cutter's rules, so far as the subject approach is concerned, have to be compared with other recent developments in subject cataloguing or subject indexing.

41 The first rules

To begin our comparative study let us examine the very first rule, which is crucial in the sense that it sets the backdrop against which the subsequent rules are to be seen and understood. The first rule in Cutter reads as follows:

Make the author-entry under (A) the name of the author whether personal or corporate, or (B) some substitute for it.

The first rule of the subsequent three codes, namely, CR, ALA, and AACR are as follows:

CR 1: Enter a work under the name of its author whether individual or corporate.

ALA 1: Enter a work under the name of its author whether personal or corporates.

AACR 1: A. Enter a work, a collection of works, or selections from works by one author under the person or corporate body that is the author, whether named in the work or not.

B. If the publication attributes the authorship erroneously or fictitiously to someone who is not the author, enter it under the actual author and make an added entry under the attributed author if he is a real person.

411 The comparison

It may appear that the AACR rule is much more comprehensive than Cutter's rule. Much of what is contained in AACR 1B is actually available in Cutter's rule 2 and its commentary. Cutter did not miss them but had taken care of them in a different way. The second part of Cutter's Rule 1, namely, 'some substitute for it' covers a number of situations, including pseudonym, editor of collections, and various types of collections with common title and without common title. The idea of 'substitute' of author's name was a useful way of providing a prescription for a number of bibliographical conditions.

In the first two rules of Cutter, the two main bibliographical conditions that are taken care of are: the name of author known and the name of author not known. The same dicotomy, if we may say so, is very much discernible in the first two rules of the AACR. In both the rules Cutter was concerned with single author only and so are the AACR rules.

42 Pseudonymous author

Cutter had recognised pseudonym as an important substitute of author's name. Hence, definite prescriptions were given for different situations. His prescriptions about choice of heading are contained in rules 7 and 97. They are as follows:

Cutter 7: Enter pseudonymous works generally under the author's real name, when it is known, with a reference from the pseudonym; but make the entry under the pseudonym, with a reference from the real name, when the writer habitually uses his pseudonym or is generally known by it.

Rule 97 also prescribed the same treatment in slightly different wording. In dealing with pseudonymous works, the basic problem a cataloguer is faced with is under which name to enter - the real name or the pseudonym? This assumes, of course, that the real name also is known. Cutter's prescription appears to be quite specific. He allowed entry under pseudonyms under two conditions:

(a) when the real name is unknown, and

(b) when the pseudonym is generally used by the writer or is much better known by the public.

So far as the first condition is concerned, it is quite simple. All cataloguing codes prescribe such a treatment when the real name of the author is unknown. The second condition takes care of a number closely related but different situations. For example the author may be using his pseudonym only in all his writings, or he is using his real name as well as pseudonym, or he is using his real name as well as a number of pseudonyms, and so on. A glance at the relevant rules of the subsequent codes will reveal that the situation has not improved much since the days of Cutter. In fact, changes, even though not very significant, have come along the lines indicated by Cutter himself.

In all the rules regarding treatment of pseudonymous works, there has been a marked preference for the real name. Entry under a pseudonym has been granted under only strict conditions. The rules of the CR, ALA and AACR have all either relaxed or made these conditions stricter. The CR, for example, had made the condition very strict, Rule 38 stated:

"Enter under pseudonym of a writer when the real name is not known and add the abbreviation pseud. in the heading..."

Thus, only one condition was allowed for entry under a pseudonym, that was when the real name of the author was not known. Subsequently, the ALA and the AACR have allowed entry under pseudonym under more conditions. In the AACR, the principle behind the prescriptions is to enter 'under the name by which the author is primarily identified'. This, naturally allows entry under pseudonyms on more occasions. The point that is tried to be made here is that the spirit of the most modern principle of the AACR was implicit in Cutter's rule in the words 'is much better known by the public'.

Apart from the above implicit acceptance of the principle which fitted very well with Cutter's stated principle 'the convenience of the public is always to be set before the ease of the cataloger', Cutter made it quite explicit in the long note following rule 7. The relevant portions of it may be quoted here:

"I am now in favour of frequent entry under the pseudonym, with reference from the real name. I recommend the pseudonym as heading in the case of any popular writer who has not written under his own name...

It is plain that this practice of entering under the best known name, whether real or false, puts and end to uniformity of entry between different catalogs, leads to inconsistency of entry in the same catalog, and will often throw the cataloger into perplexity to decide which name is best known; but for the last objection it must be remembered that the catalog is made for the reader, not for the cataloger..."

Thus, in the light of the above extracts it should be clear that the stand taken by AACR was advocated by Cutter long back. To advocate entry under a pseudonym, even when the real name was known, was such a bold and profound move which only a code maker of the eminence of Cutter could take.

'The convenience of the public' was then the most important guiding principle for Cutter. We have seen its application in the case of pseudonymous works and he was on firm grounds.

43 Festschriften

However, application of the principle in certain bibliographical conditions now appears to have produced very strange rules. As an example, let us consider the case of 'Festschriften', which Cutter defined as 'collections of dissertations published in honor of a man'. Such publications, within the group of collections, have been engaging the special attention of all code makers. A unique problem is created by the fact that such a publication is usually known and referred to by the name of the person in whose honour the collection is published. Hence, convenience of the public will dictate that the entry be made under the name of the person honoured. But he cannot be considered the author of the publication by any stretch of imagination. Hence, in an author-title catalogue how to permit such an entry? The convenience of the public principle prompted Cutter to avoid giving entry under any other name. The prescription is contained in rule 108, which reads as follows:

"Festschriften, i.e., collections of dissertation published in honor of a man, may be entered under his name with the addition of subject, or testimonial, or a similar word".

Subsequent codes have gradually derecognised the importance of the name of person honoured and shifted it to the names of societies, institutions, and editors who can be said to be responsible for the existence of such publications. For the first time, the AACR has not even recognised festschrift as a separate category of publication. They are to be treated like any other composite works. The point that is tried to be made is that cataloguers and point that is tried to be made is that cataloguers and code makers have realised the need for principles behind the rules. It is not that Cutter's principle of the convenience of the public has been rejected or forgotten but in addition to that more principles are necessary.

44 Names of married women

Coming back to the question of names, married women seem to have attracted considerable attention from all code makers. Marriage means change of name for a woman and change of name poses cataloguing problem. Because, the object of the catalogue, as stated by Cutter, "is not merely to facilitate the finding of a given book by an author's name, but also to provide for the finding of all books of a given author". To take care of change of name coming from wedlocks, Cutter prescribed entry under the new surname of the woman. This ruling meant that the entries had to be changed with every change in the name. Evidently, the ruling was in deference to the requirement to find all books of a given author. However, a note was added to Rule 24c to caution the cataloguer not to take this rule too far. This interesting note reads as follows:

"Wives often continue writing, and are known in literature, only under their maiden names..., or after a second marriage retain for literary purposes the first husband's name. The cataloger should not hurry to make a change in the name as soon as he learns of a marriage. Let him rather follow than lead the public".

The above rule, in spite of the note of caution, must have caused many changes in the catalogue. As a consequence, cataloguers seem to have started supporting the other extreme view of not changing at all the names of married women. This is clearly reflected in Rule 41 of the CR. It prescribed to 'enter a married woman under the earliest name which she has used as an author'. This prescription of CR assured the stability of the entry as marriages were not to affect it. This assurance facilited the finding of all books of a given author but equally hampered the other objective of the catalogue, namely, facilitate the finding of a given book by an author's name.

That the above choice of CR was not a happy one is clearly revealed by the fact that the ALA code nearly reversed the position by its rule 46. It stated "Enter a married woman under her latest name unless, ... she has consistently written under another name". The AACR also takes a similar stand. A distinction between different cultural groups was also created. For English names, the prescription was to make the entry under husband's surname rather than the maiden surname (rule 46B3b).

On the whole it appears that there has not been any significant change in the cataloguing practice of names of married women since the days of Cutter. Attempts to get away from the prescription of Cutter have only brought us round nearer to it.

45 Revisions

Revisions form an important category of publications. In the cataloguing practice of revisions the deep impression of Cutter's view can be seen through the succession of the codes. The relevant rules are quoted below:

Cutter 18: A revision should be entered under the name of the original author unless it becomes substantially a new work.

CR 19: Enter a revision under the name of the original author unless it has become substantially a new work, in which case it is to be entered under the reviser, with a reference or an added entry under the original author.

ALA 20: Enter a revision under the name of the original author with added entry for the reviser.

AACR 14: A. In general, enter an edition that has been revised, enlarged, abridged, condensed, etc., by another person, under the original author, with an a added entry under the other person.

B. If the new edition clearly indicates that the work is no longer that of the original author, however, enter it under the new author. Make an author-title added entry under, or an explanatory reference from, the heading for the earlier work.

In applying the prescription, which is same in all the above rules, one practical difficulty that a cataloguer has necessarily to face is how to judge whether a revision is substantially a new work. Cutter was very much aware of this difficulty and to help the cataloguers he supplemented the rule by the following note: "There will often be doubt on this point. To determine it, notice whether the revision is counted as one of the editions of the original work, and whether it is described on the title-page as the work of the original author or reviser, and read and weigh the prefaces. Refer in all doubtful cases".

The ALA rule 20 also had a note attached to it which read as follows: "The rule applies as long as the work remains substantially that of the original author, especially if it purports to be an edition of his work. If, however, the revision is substantially a new work, enter it under the reviser with added entry for the author and title of the original work".

A cataloguer will hardly get any guidance from the ALA note quoted above. Nothing has been said as to how exactly it is to be decided whether a work remains substantially that of the original author or not. The AACR 14B also simply states 'if the new edition clearly indicates', without any hint as to how exactly this is indicated. Compared to these, Cutter's note, as quoted earlier, is far more practical. It very clearly emphasises three things — whether the work is counted as a new edition of an earlier work, who is shown as the author in the title-page, and what the preface says. Out of these three hints, the second one, namely, indication on the title-page, was a very significant one. Unfortunately, this point was lost sight of in the controversy that reged over the issue whether we catalogue a book or a title-page. Most of the references to title page were deleted in the CR and ALA. Opinions started changing again since the days when talks about revision and rationalisation of the ALA Rules started. The AACR has come round to recognise the importance of the title page and there are explicit mention of it in some rules. One prominent mention of it is in Rule 3 where indication of the principal author has been prescribed to be determined by typography or wording in the title page of the work. It is unfortunate that the same principle was not accepted in the case of rule 14 of the AACR.

Perhaps, it would not be wrong to say that the path that was shown by Cutter was the right path but due to our apprehension we have realised that only now. It would be appropriate to mention that at least one code, namely, S.R. Ranganathan's Classified Catalogue Code, has fully accepted the importance of the title page which is reflected in an important principle, that is, the Canon of Ascertainability. It is true we catalogue books and similar documents but there is nothing wrong in giving proper importance to the title page. The message of this Canon is "The safest course to determine the choice of the heading is to rely on the Canon of Ascertainability - that is by what is indicated in the title-page, rather than sit in judgement over what is given in the title-page."

46 Entry of periodicals

A similar problem, like the change of name of persons, is the change of titles of periodicals. As women change their names after marriage, so do periodicals change their titles due to a variety of reasons. One cataloguing problem is under which title to enter – the earliest, the latest, or the title under which a periodical runs for the longest time. The other problem is whether to enter all periodicals under title or some of them, which are sponsored and associated with the names of corporate bodies, could be entered under the names of sponsoring agencies. All the cataloguing codes have included rules on these two aspects. Let us first have a look at the relevant rules.

Cutter 133. Periodicals are to be treated as anonymous and entered under the first word, not an article or serial number.

A note following the above rule reads as follows:

When a periodical changes its title the whole may be catalogued under the original title, with an explanatory note there and a reference from the new title to the old; or each part may be catalogued under its own title, with references, "For a continuation, see," "For the previous volumes, see."

CR 121 Periodicals. Enter a periodical under the first word of the title not an article and give in the form of notes...

If a periodical has changed its name enter it under the earliest form with brief entries under later forms.

A regular periodical issued by a society or an institution is ordinarily to be entered under its title, especially if this is distinctive in character.

ALA 5C Periodicals and newspapers. Enter a periodical under its latest title. Make a reference or an added entry for earlier title... In the case of a periodical which has ceased publication, make exception in favour of entry under an earlier title used for a much longer period than the later title...

A periodical issued by a society, institution, or government body is ordinarily to be entered under its title (especially if this is distinctive in character) with added entry for the issuing body.

AACR 6A. Enter a serial that is not issued by or under the authorship of a corporate body and is not of personal authorship under its title.

6B1. Enter a periodical, monographic series,... issued by or under the authority of a corporate body, under its title with an added entry under the corporate body.

Exception. If the title (exclusive of the substitle) includes the name or the abbreviation of the name of the corporate body, or consists solely of a generic term that requires the name of the body for adequate identification of the serial, enter it under the body.

6B2. Enter any other serial issued by or under the authority of a corporate body. In case of doubt that the serial is covered by 1 above, enter under the body.

6D1. If the title of a serial changes, if the corporate body under which it is entered changes or undergoes a change of name, or if the person under whom it is entered ceases to be its author, make a separate entry for the issues appearing after the change...

461 Authorship of a periodical

From the above extracts of the rules, it would be clear that the practice of entering periodicals under title has been well established since the days of Cutter. It has remained unchanged in the CR and also in the ALA. The AACR has slightly deviated from this well established practice. The 'Exception' to rule 6B1 and rule 6B2, as quoted above, together recommend entry under the names of corporate bodies for a good chunk of the periodicals which are issued by or under the authorship of corporate bodies. However, it should be mentioned that there is some difference on this point in the North American and the British editions.

There have been discussions and debates on one point when a periodical is entered under the name of corporate body. The point is whether such a body can be considered as the author of the periodical. If not, then what is the logic behind putting the name of a corporate body as the heading? One guiding principle that was adopted at the International Conference on Cataloguing Principles at Paris and accepted by the AACR is that when authorship is 'diffused' the entry should be under the title. In a periodical, apart from periodicals by personal author, authorship is diffused and hence entry under title alone would have been a logical stand.

So far as Cutter was concerned, this point was admirably tackled by taking a different line of logic, part of which is available in rule 133 itself. It clearly, states, 'periodicals are to be treated as anonymous...' Similarly, in rule 102 the title of a periodical is considered to be a'substitute' of the name of the author, just as a pseudonym is. It may be recalled that the first rule of Cutter is "Make the author-entry under the name of the author... or some substitute for it". Thus the accepted principles are fully reflected in the rules.

462 Change of title of periodicals

The question of under which title to enter in cases where periodicals change title, has been met in different ways by the codes. As has been quoted earlier, Cutter prescribed entry under the original title with reference from later titles. The CR fully supported this stand. The ALA completely reversed the position by recommending entry under the latest title. Not only that, an exception was also made for periodicals, which have ceased publication, by recommending entry under a title used for a longer period than the latest title. In both the practices, as recommended by Cutter and CR on the one hand and the ALA on the other, there are certain advantages. Behind the apparent unlike prescriptions there runs one common line of thinking. It is the desire to have the main entry under a single title. In a large library this is very much necessary. As for example, the Library of Congress is obliged to catalogue each serial as a single bibliographical entity, regardless of change of title, issuing body, or name of issuing body.

It should also be mentioned in this context that the AACR has got away from this long tradition by prescribing 'If the title of a serial changes..., make a separate entry for the issues appearing after the change...' Perhaps, this practice is nearer to the principle of convenience of the public, so dear to Cutter. It may be that the significance of this principle is much more appreciated now in the changed contexts of the bibliographical world as well as the users of the catalogue and their requirements. What is hinted is that periodicals have assumed greater importance in every library than they had in Cutter's time. There are surely much of them in every subject field. It may be that the phenomenon of change of titles of periodicals is a more common place occurrence now. The users of the periodicals, and hence the catalogue, and their approach to periodical literature have also changed. The users are no longer specialists only. In any field, even a specialist is fully familiar with a number of his 'favourite' periodicals only. But he may have to approach a number of periodicals occasionally. Interests of many users are now not for the complete run of a periodical but for a particular contribution in it. For all such situations, the latest or current title of a periodical is more helpful and the catalogue also should respond to this.

5 Corporate Authorship

The rules on corporate authorship framed by Cutter have a special significance. The concept of corporate authorship was quite new in those days both for the cataloguer and the reading public. Many people had genuine doubts as to whether bodies of men could be considered as authors of works published in their name or by their authority. One important factor to keep alive this doubt was the strongly entrenched German practice of treating all works issued by corporate bodies as anonymous for purposes of entry. Cutter gave the most powerful support to the idea of corporate authorship in an article in the Library Journal (vol. 22). He wrote, "I tried to find a few simple principles around which all desirable practices could be grouped. One of these principles is corporate authorship and editorship. I have as yet seen nothing to convince me that it is not a good one, since it corresponds to fact, inasmuch as societies are the authors of their proceedings and the collectors of their series..."

The above conviction is crystallised in rule 45, called General principle, which reads as follows: "Bodies of men are to be considered as authors of works published in their name or by their authority." This principle is visibly reflected in a number of rules that follow, for example, rule 61 (corporations and quasi-corporations), rule 65 (colleges), etc.

In need hardly be emphasised that all the subsequent codes have been following the same principle. One important aspect of Cutter's code is that the difficulties of many important rules are anticipated and necessary guidance given. The rule 45 has an important note where the difficulties of the corporate authorship are very neatly analysed. The note reads: "The chief difficulty with regard to bodies of men is to determine (1) what their names are, and (2) whether the name or some other word shall be the heading..."

It is well known that all the modern code makers have felt the same difficulties that were so penetratingly analysed by Cutter. Most of the recent developments have progressed along the indicated lines. The stand taken by the AACR regarding specific names of bodies of men or a specific name of a conference is, in a way, a development directly emaneting from the question what their names are?'. Similarly, acceptance of the new principle embodied in the Canon of Recall Value is a development from the second point of Cutter, namely, 'whether the name or some other word' shall be the heading...'

6 Subject Headings

As has been said earlier, Cutter's code was a complete cataloguing code. The other codes that we have been considering here are all focussed on author and title approach only. Cutter took care of subject approach also. He had before him the model of a complete dictionary catalogue.

Discussing Cutter's treatment of subject approach, E J Coates has said "In the historical development of any craft there is always a well-marked stage at which a line of intuitive and empirically minded practitioners is brought to an abrupt end by someone who succeeds in reationalising the best current practice into a few general principles which can thereafter be applied consciously". Cutter's rules on subject cataloguing mark this stage and they were the beginnings of rationalisation.

It should be pointed out that Cutter was very much aware of the difficulties of this area of cataloguing. He wrote "The importance of deciding aright where any given subject shall be entered is in inverse proportion to the difficulty of decision... But it is better that such decisions should be made to conform when possible to some general system, as there is then more likelihood that they will be decided alike by different catalogers, and that a usage will grow up which the public will finally learn and profit by..."

The above, then, sets also the task which Cutter addressed himself to. The first rule which Cutter prescribed is so profound, though simple, that it embodies the complete principle of alphabetics-specific subject catalogue (dictionary catalog) in it. This celebrated rule (161) reads "Enter a work under its subject-heading, not under the heading of a class which includes that subject". This rule, as is known, is the starting point of all subject indexing practice.

In his search for 'general system' for rule of 'specific entry', Cutter was mainly concerned with names of subjects and particularly those subjects which have no names. Looking at the development of various indexing languages, in recent years, it appears we have been still working in this area, that is, how to make a specific subject entry for a subject which has no name. These indexing systems have all started exactly from the point where Cutter had left. Julia Pettee had very rightly said in 1947, "Catalogers have struggled along with no more authoritative rules for subject headings than the half dozen pages in Cutter's Rules, first set forth for the printed catalog nearly three quarters of a century ago." If we have been able to proceed further, it is due to Cutter's wisdom and experience crystallised in his Rules.

LOOKING BACK TO DEWEY'S NOTATION AFTER HUNDRED YEARS

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The present study starts with a review of materials at hand and makes some enquiries upon the process leading to the discovery of Dewey's scheme of classification and its socio-cultural background and puts the use of Decimal notation as the pivot of the scheme. It then goes on to analyse the properties of notation in general and examines Dewey's notation against them. Also suggests some possible notational systems which may be experimented with for retrieval purpose.

1 THE ORIGIN OF DC

Several studies have been made into the process of a discovery [1]. Such studies which are mainly concerned with the finding of the laws of creative activity are called Heuristics [2]. Until recently no serious attempt has been made to find out as to how exactly Dewey arrived at his scheme of classification. Dewey's own account of it, put in the preface of the first edition of DC, is apparently vague and scanty [3]. It aroused the inevitable controversies [4]. Ranganathan on the other hand has clearly stated the origin and development of his ideas and the way they have been presented, they are likely to be accepted by all [5].

Recently there has also begun a trend of studying the socio-cultural and economic backgrounds to an individual discovery or invention. Usually, a fruitful idea is conceived, born, develops, and then gains ground only when there is a socio-cultural tradition and pressure and the field has already been prepared for it [6]. Such studies, though common already in many branches of science, are not available in the field of Library and Information Science.

11 The Socio-cultural Background

It is significant that Dewey was an American of late nineteenth century. That Bliss wrote his book in a period between two great wars and that Ranganathan happened to be an Indian, basically trained in mathematical science, are two examples showing how the time, the region, the context of socio-cultural background and environment of the personalities concerned come into play. It is also not surprising that at a certain period many classification schemes were devised in America and England that gave a new boost to organized classification research after the Second World War.

Let us consider the evolutionary history of Dewey's discovery of DC. In 1876 the Americans were to celebrate the first Centennial of their independence. They were already preparing for it. If we observe the phase of history we find that the mechanistic philosophy had already culminated in Europe as the industrialization reached its optimum since the days of James Watt. Capitalism had grown out of its own balance and turned into well set imperialism and had sought grounds in the countries of Asia, Africa and Latin America. Everywhere was a cry for new orientations, the vehicle being essentially the printed papers – books and journals [7].

12 The Challenge from Growth of Printed Materials

Soon after the American revolution, upto the Civil War, it was really a tensive period of change from agrarian to industrial set up. The settlers after they had settled a bit and as knowledge began to be imported from the old world, universities and colleges started coming up, the independent workers in the fields or in industry wanted to know the newer techniques; in homes a hunger for cultural resources was felt. The only book, the Bible gave place to every other sort of printed materials. We must remember that the radio and T.V. were yet to come, telephone networks were not developed, communication and education both rested heavily on the written or printed matters. Gradually the libraries were growing everywhere. All through American history it is found that human resource has always been scanty and therefore there has always been a cry for automation and smoothing off of work procedures.

121 The Outmoded Method in the Old World

In the old world of Eruope the growth of printed materials overburdened the libraries but not to the verge of a collapse. The system already developed and tried in Europe was deeply rooted and any radical change would have taken a lot of trouble and would not be popular among the professional workers, the authorities or the users. In America the scene at that time was totally different. The new era of inventions and technological progress began to usher in that virgin and wealthy land many changes. The library resources were just begining to grow and with it the need for a working system to organise the growing resources was being felt [8].

122 New Method for the New World

In such a perspective any scheme of organization of knowledge which freed libraries from labelling the shelves and put to practice the method of relative location was, naturally, highly receptive. It is not Dewey who first thought of this change, however, it was he who could devise a scheme to be effective, simultaneously providing it with a number of other functionalities.

2 THE TRICK OF THE DECIMAL NOTATION

Use of decimal numbers in labelling was not completely new, but most of the classification schemes, philosophic or otherwise, were subjected to dichotomous division following the porphyrian tree. In the case of his subject divisions Dewey, again, was not the pioneer [9]. But he did two things. In the arbitrary division of the universe of knowledge he took 'Ten' as the basis and continued with 'Tens'. He did not make his units arbitrary in number in different stages of division-chain. Secondly, he invented the Generalia Class.

It is therefore seen that like all great inquiring minds he borrowed what was necessary from every possible sources at his hand, discarded what he felt inconsistent, modified some in a manner best suited to his purpose and showed his genious in assimilating all those in a coherent whole. To achieve this he had one goal or purpose, that is, easy organization of books for smooth retrieval most convenient from the stand point of the users. All these were made possible by the single trick 'the use of decimal notation'.

There is some difference of opinion on questions like Dewey's most important contribution (1) - is it the Decimal system of notation or anything else; (2) how he arrived at using Decimal notation, and (3) is it that much importance on notation has in a way hampered progress in classificatory practices and principles to grow?

21 The Importance of Notation

Dewey himself thought his most important contribution was the 'Relative Index [10], what Bliss had phrased as "the subject index illusion [11]. Bliss was the first major critic to Dewey's system. To him the best achievement of Dewey was his notation and detailed enumeration [11]. The other staunch critic of DDC, S.R. Ranganathan, regarded the use of decimal notation as the first revolutionary achievement in Library Classification. To him "the most potent and lasting contribution of DC. is the demonstration of the practicability of securing hospitability of notation by the simple device of decimal fraction notation" [12].

A notational system cannot exist by itself or be primarily independent of the classification system, it is said. A system of notation is like the script of a language. A script by itself is dead, it is only the vehicle of the language associated with. But a notational system bears a language character in itself. It is true that the notation cannot stand by itself without a scheme, but the notation on its part moulds the scheme. It is not possible for the DC, in its present structure, to have another notational system and yet get the same effectiveness. In fact, the scheme will be spoiled.

In this generalized version, notation is the prime of any classification scheme. The whole of a schematic structure of classification grows upon its particular notational system. I do not agree with the popular convention that classification means arrangement only, or it aims at arrangement. Any one scanning through the present literature would find this notion not only false but unworthy and misleading. The various definitions given by Ranganathan in the Prolegomena [12] show that all of them do not fit in the present situation. The goal of bibliographic classification is smooth retrieval. From this stand point we can define classification as – Classification generates a system of organization that can establish an order in a set or assembly (of things, ideas, notions, objects etc.) for smooth retrieval. An effective library classification is to be designed so as to make the most direct mapping and correspondence between the set of clientele and the set of library resources. If we accept every library as a memory store, the retrieval point of view of classification becomes apparent [13].

Parkhi, being surely motivated by Ranganathan, has stated, "The problem of devising a simple scheme of notation was possibly more difficult than deciding upon the plan of arrangement of the main classes. None of the philosophical classifications had a notation" [14]. We also know that scientific classifications though use organisation and symbols they never use any notation. But recently for machine storing, sorting and retrieval some notational device seems to be imminent for them also.

So we see that notation is not essential for organization but necessarily inevitable for retrieval after storing.

3 HOW DEWEY GOT THE IDEA?

31 Historical Evidence

Until lately materials regarding Dewey's invention of the scheme had been mostly subjective, scattered and few. A recent study by John P. Comaromi largely corroborates this viewpoint [15]. What seems most logical as to Dewey's discovery is that

Dewey intuitively chanced upon the Decimal number notation. Eventually, it proved to be uniquely working. It can also be imagined that Dewey as a student cum library assistant stumbled over the problem of smooth retrieval of books in his college library. Disgusted with the then systems, both as a user and a service assistant, he went on meditating over the problem. As soon as he solved the problem for his own library he could generalize it for all other libraries. Any genious can generalize a specific problem.

Dewey not only glimpsed the right solution but he could establish it and make it work. Wayne Shirley has commented about him "... We owe much to that master organiser and master promoter. A list of his accomplishments read like an outline of a course in library administration; nor should it be forgotten that while he was doing these things for us he was organising and promoting simplified spelling and Metric Reform for the rest of the world... This man was a genius and hence very troublesome,... but he did have ideas, and he knew how to get his ideas tried. Apparently Dewey cared little for what was in a book, but he did care much about getting books to every one with greatest possible efficiency. .... How Dewey would have loved the mechanisms we are developing to make our services faster and more accurate" [16].

Rightly Dewey was a very practical man and a a mechanical man. By mechanical I only mean that he was grown out of a world of mechanistic philosophy and had his bent towards mechanistic approaches rather than pedagogical or epistemological.

Simultaneously, C.A. Cutter came out with his Expanvive Classification Scheme. This was based on much more research and experience than Dewey. But it lacked the very flavour of workability necessary at that time in that country. His classification failed because "Cutter was so much a scholar he never finished the system, as he was always perfecting it, even though one of his contemporaries said that when used by a large library - 'Botany ran up through the stacks like a tree" [16].

This is also apparent when the old world became pressed with indexing problems. it tried to find out systems other than Dewey's and became highly critical of it. We may remember that La Fontaine approached Cutter at first and not Dewey for a suitable scheme for the I.I.B.

Comaromi has reviewed the process of Dewey's invention in a little more detail. Dewey's own claim that he only got his sparkling influence from the Italian publisher Battezzati is untenable. At the same time the various claims by others for anticipating Dewey are also of little importance. Almost all the documents show that the scheme was devised by Dewey himself.

It is highly probable that Dewey was much influenced by the other sources, yet the contribution which to day we know as DC is his own. Comaromi considers the different alternatives and is highly critical of Dewey's acknowledgement to Battezzati. He says, "by giving first place in influence to a scheme (Battezzati's) that few would know and that had not influenced him and then giving no place to the two schemes that most would know and that had influenced him, Dewey vitilated any claims to originallity that Harris or Schwartz could have made, thus protecting his copy-right, upon which by the way, the very idea of uniformity of classification depended. It appears to me that is what Dewey was up to in his acknowledgement paragraph." [15]. Comaroni's suggestions are that Dewey had been influenced by Bacon - Harris or Schwartz schemes or by both or he invented it himself. He however does not put much significance to John Maas's suggestion that Dewey probably got his idea from William Phips Blake, a nineteenth century American scholar of repute. Blake used a decimalized Hindu - Arabic numeral system to classify the exhibits of first centennial anniversary of American Independence (1776-1876). The proposal for such a system was actually put at a meeting of the Centennial Commission in Philadelphia on May 25th, 1872 and was adopted [17].

32 The Possible Logical Course of Development of DC

We cannot go further into the historical enquiries along the above lines because of the fact that we are not having easy access to the primary sources. I for myself however, without being motivated by any of the above, can make a logical suggestion. From my personal experience and from some case studies, either those available in print [18] or through personal communications (mostly verbal), I believe that the flash or first spark of a really good idea may come irrespective of space and time to an intuitive and inquiring mind, even at a very immature stage of preparation. The question is then to nourish it, analyse it, discover its workability and significance, and then to develop it in every possible way. At this stage comes the environment and background resources to play.

If such an idea is taken up seriously by the person concerned, he or she not only thinks and meditates over it but goes on discussing with others and in almost every case tries to find out in other sources for inspirations, similitudes etc. When one gets even little hints in other sources, he is at the same time both delighted and disappointed. He is delighted, because he no longer feels lonely, he is assured that most probably he is on a right path. He is disappointed because he now becomes aware of a rival to claim a share or priority for the idea. The right man in such cases goes on pursuing on his own and makes substantial progress in many respects. A vigorous man like Dewey would not just stop at writing down an article or even the scheme. He would try to find its drawbacks and prospects and would use it, propagate it and in that would bear no opposition.

Here is another point to note. It is about Dewey's life [19]. In 1870 he was only 19 years of age. As we know of his early life, he acquired a strong 'mathematical' ability and had a fascination with systems, classifications and arrangements (at five he is said to have organized his mother's kitchen). His mathematical ability would mean here 'arithmetical'. Because we know that higher study at that time in America meant only college level and high school education. The main bulk of mathematics was arithmetic upto the high school level. Dewey had also a disruption in his studies due to monetary reasons. He was fifth and youngest child in a low middle class (poor ?) family. So when he could again join the college, he had to work as library assistant. Considering this, we may understand his bias for arithmetical systems and adoption of Hindu-Arabic numerals. We can also understand his psychology for gaining supreme authority in case of his discovery and the gusto with which he propounded it.

It is highly improbable that Dewey at that age and with that background would be knowing all the system for himself. It is my belief that Dewey got the germ idea of trying decimal notation of his own. May be that the conceiving of the idea was concurrent with having seen Battezzati's arrangement in some publisher's list.

After this Dewey must have made a literature search and surely came to know of Harris, Shwartz and others. It seems not so likely, as Comaromi also believes, that Dewey was in the knowledge of Blake's system. Because Dewey definitely got the germ idea at least as early as before 1873 and Maas's system was discussed in mid 1872 and was effected in 1876. It will be a wild and improbable guess that these two persons exchanged ideas. But Dewey could surely come to know of Blake's system in 1876 or little earlier, because he was one of those who took initiative in the conference of the librarians at the Centennial exposition.

Lastly, we should keep in mind that before a real progress is initiated or its propagation is launched, an idea is in the air for a good deal of time. A number of minds may be siezed with the same idea but only the one competent enough to create the landslide comes out first with it. Einstein's discovery may be recalled in this context [20].

33 Notation is the Central Idea of DC

Dewey's scheme itself is an evidence to the idea that his contribution is centralized upon the notation. Once the notation was thought of every other thing followed, the main classes, the subdivisions, the use of form divisions, the relative index and all the rest.

As has been stated earlier, the notational device moulds a scheme. The numerals have in themselves the order sequence. The Hindu-Arabic system has its base in ten. One can progress only with a power of ten. Exhaustively allocated, the length of the notation is expressed by the formula: $x_i 10^n + x_i 10^{n-1} + \ldots + x_i 10^2 + x_i 10 + x_i$, where x_i may be any of 0, 1, 2, . . . 9 and n is any arbitrary integer; the total number of subjects possible to be enumerated is $10^{n+1}-1$. Dewey had no other choice than to make 10 or 100 main classes. They provide systemetry. He was compelled to allocate in the same way mathematics and astronomy, logic and engineering, English language and German language. It is not possible with such a notational system to anticipate and provide for arbitrary relative or uneven growth of subjects.

When documents were to be grouped according to subjects and the subjects arranged according to a para-artificial language of notational symbols, it was necessary to create a device for linking from the natural language to the para-artificial one and that was the index. However, Dewey could collocate the subordinate and related subjects to a "central theme" which may be the 'Sought Link'. This was manifested in his relative index. He could imagine of this because situation in his notational system could induce it. These two arrangements made it possible to have the 'subject-groups' together and physical arrangements, even when disturbed, could easily be restored. As the clientale increased and also technical work, the only way out was to bring forth the philosophy of open access into librarianship. Library holdings now could be easily manipulated.

How much a good notation can achieve and a bad notation hamper is evident in mathematics [21]. The same is probably true to librarianship. Decimal notation ushered in newer possibilities of analytical researches in classification theory itself.

34 DC was a Device in the Nineteenth Century Context

Dewey's scheme is a device. Though it is called some times 'analytical' instead of its better adjective 'enumerative', it was produced phenomenologically, arbitrarily and synthetically. Dewey gave unto librarianship a scheme that would work efficiently, serve his purpose and the purpose of American libraries of late nineteenth century. He weighed heavily upon the process and the technique. He thought of the cadre who would use it in the libraries. Although he himself was one of the organisers of early library schools, he did not think of educating a cadre to be fit to use an analytical scheme based on scientific research with principles and theories.

This was his American heritage. "... The first (weakness of heritage) is our love of gadgetry. If you wish to have a good understanding of this read through the early volumes of the Library Journal... Dewey loved efficiency so much he would go to great lengths to attain it... Cutter number was an invention, DC was a gadget" [16].

To get the historio-cultural background to this one can refer to the various chapters of the Oxford History of the American Peoples and other history books. In the seventies and eighties of the nineteenth century "the American nation of a scientist still remained, as before the war (Civil War), a practical inventor such as Thomas Edison; the American idea of a scholar who taught Latin, Greek or mathematics in a small college" [22].

4 A TEST OF DC NOTATIONAL SYSTEM

Many pages have been written about the notational systems, their qualities and characteristics. The vital significance of notational symbols are not always recognised. But they are always playing one of the decisive roles even in the newer special schemes developed recently. A Russian view is, however, "not all systems of library classification which came into existence in recent years are of equal interest from the point of view of notation. Firstly, because foreign experts in classification in their search for a very good basis for notation often pay less attention to the scientific and the logical aspects of classification itself in the name of mechanical simplicity of finding information. Secondly, authors of the new classification systems abroad often solve their problem in an one sided way without taking into consideration the experiences accumulated in this field" [23].

After a detailed study of the properties or qualities to be expected from a notational system of a scheme of classification the following schematic list of such properties under eight main heads can be prepared. The terms are defined in available in textbooks [24]. DC notation can be studied in that background. It is, however, to be noted that all of these properties are not independent, nor are supplementary; there are a few which are overlapping, at least one may be found at two different places, some are even contradictory to one another.

Properties of Notation	DC Properties
1. Memorability	
(a) Simplicity	DC notation is very simple
(b) Psychological simulation	
(i) Pause in notation (observability & perception)	DC complies to it
(ii) Syllablic (First motivated by E. deGrolier)	Does not arise in DC
(c) Brevity	
(i) Base of the notation	Not large for being brief
(ii) Allocation	Not bad, but not much effective now a days
(iii) Synthesis	Possible only to a small extent
(d) Mnemonic	
(i) Literal or Verbal or Alphabetic	No
(ii) Systematic	Yes
(iii) Scheduled	To some extent
(iv) Seminal	No
(v) Notional/Schematic	Yes, to some extent
2. Hospitality	
(a) Helpful order	
(i) Citation order	DC has its inherent structure to be followed in these regards
(ii) Filing order (Though (i) and (ii) are much similar they are not identical)	
(b) Hospitality in chain	DC allows it infinitely in principle.
(c) Hospitality in array	DC is cripple
3. Expressiveness	
(a) Newer symbols	No scope in DC in its usual form
(b) Functionals	
(i) Relational operators	No such device
(ii) Connecting symbols	Zero may be considered in a limited way to have function as Connecting Symbol but DC has no conscious effort towards it.
(iii) Role indicators	None may be called
4. Co-ordination	
(a) Synthesis	Scope is limitted in DC
(b) Extrapolation	Not effective
(c) Categorization	Absent

5. Flexibility	
(a) Alternative location in array or facet formula	Does not permit
(b) Broken order provision	Not implied but can be used.
6. Retro-activity	No
7. Shelf notation	Not intended in DC
8. Mechanization	In various ways mechanization is possible with DC but cannot be very much effective because of non-promoting of a suitable programming language with present symbolic form of notation [25].

In the above list, flexibility may be replaced by a larger generic term Elasticity (or Plasticity would be more appropriate?) which would mean not only flexibility but also torsion and may include shelf notation and hospitality. In case of Functionals all may not agree with its three components. Isaac [26] has dealt with them in some detail. He starts with their being same but quotations and statements that he gives, later on, show their differences. It is better to use connecting symbols in the sense of neutral conjunctors in between two concepts. Whereas a role indicator is to be put along with a concept to denote the role of the concept. The facet indicators of Colon Classification do the same. The relational operators are those of Farradane's [27] and they not only depict the relation between two concepts but also suggest the composite concept mapped from this binary set.

Not everyone would completely accept the properties of notation as given above, the present author himself likes to have deeper and closer analysis and recast them. The notation of DC is self-expressive and heiraracical. But it is not co-ordinating in itself.

5 SYMBIOSIS BETWEEN A SCHEME AND ITS NOTATION

The symboisis of a scheme and its notation should be kept in mind while creating a new scheme. One can either choose a notational system at first and then construct a scheme upon it with two sided modifications. Otherwise the scheme is to be elaborately organized and then the notational set up developed to suit the scheme. The classificationists have not in most cases divulged their methodology in creating symbols for their notation. So far they have been borrowing freely from the well known and established systems of symbolic forms. These systems are of a few types viz., numerals (Hindu-Arabic and Roman), alphabets (Roman. Greek). the mathematical signs, printing marks, punctuations and certain other characters easily available in print. None has studied the possibilities, lest used such systems as ideographs, alphabets of the Oriental languages, and the astronomical, religious and ritualistic symbols.

This practice is most probably for economy and in anticipation of ease and familiarity on behalf of the users. But the approach is not rational and puts the scheme into the grip of the notation itself. To resolve this there are two ways. Firstly if one could laboriously experiment with all the systems of symbols and find the most suitable one for the scheme. Secondly, by theoretical study of the notational structure required, go on to create one accordingly.

Cajori has investigated through historical researches what role has been played by the notational symbols in mathematics [21]. Similar study regarding notations in library classification has not been made so far. A research into the history of notations and symbols used in Library and Information science and their workability would show us the exact picture of the classification problems and what should we do regarding notations in future [28].

51 Some Possible New Notational Systems

It is hightime, we believe, to set up independent machine manipulative notational structures for bibliographic classifications. Such possibilities are only indicated by way of a few examples:

1) Indian scripts have got better chances to fit in an analytico-synthetic faceted scheme. The consonants may be used to represent main classes and the vowels to show forms or common isolates.

2) Binary coding in matrix form may be one convenient system of notation. There will be a main string with various graphs along the main string.

3) One may think of an associative scheme to use optical frequency structures on a video-screen (or Cathode ray oscillator screen); each frequency showing a quantum or elemental concept and composition of them in Fourier's patterns, the composite concepts. There will be no difficulties in storing, recognizing and retrieving any information in that way with the help of computers. We can very easily use the known band names or even print the wave form on the documents which will be machine readable.

6 DC Modifications

DC has traversed a long way since its inception. Despite all the criticisms of the scholars it has gained ground and popularity in almost every country of the world for all types of libraries. It is used in national and trade bibliographies and even in publishers' lists [29]. There is a recent trend for special libraries to use U.D.C. or other special schemes rather than DC. The cause for this may be as much DC's incapabilities as the growth of librarianship as an academic discipline and the 'Information - technocrats' prestige in devising special schemes. DC has gone through many modifications from the monumental elaboration of U.D.C. to those in such versions as Bengali, Hindi and other languages [30], and for individual libraries. As a curious example one may consider the Calcutta University Central Library modification where books in Bengali are placed in 700 [31]. It could be a nice work if one could make a complete survey of the distortions and modifications of DC used in various libraries in India. Similar reports may be made for other regions also. Despite all the drawbacks and shortcoming of the scheme, there is a psychological apprehension of its notation. Strip off the scheme of its present notation and use any other system of symbols, it will lose its popularity instantly.

61 The Future

Looking towards the future, any one, serious about the organization of knowledge and retrieval of information, is understandably perplexed at first sight. Information channels have become so varied and complex, knowledge explosion even devastating, document multiplication so unnecessarily piled up, the subjects and disciplines so indisciplined and inter-mingled that one thinks of giving up all attempts at organization and wait for a deluge.

But there are new hopes and problems seem not completely beyond grasp. Machines and new theoretical techniques are coming up. Co-operative systems are being developed. But classification yet remains a problem. The wave generated in America that we can do away with classification has calmed down. Almost every body whether a machine-lover or a philosopher-theorist is aware of notational language now.

Dewey could not have dreamt of such a problem, but he would have been much delighted to see how in his path the modern warriors are fighting the battle and not losing. What Brown wrote in 1898 is still very much acceptable, "No system of classification has been so widely adopted or so generally appreciated, and no other system has done so much valuable missionary work in the cause of systematic classification" [32].

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DEWEY'S RELATIV INDEX - A PRECURSOR TO THESAUROFACET

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Describes briefly the development of the Relative Index in the eighteen editions of the Dewey Decimal Classification. Indicating the different versatile features of the Thesaurofacet, explains that these features are only a natural consummation of the concept of Relative Index.

INTRODUCTION

Of the many significant contributions of Melvil Dewey to the theory and practice of library and bibliographic classification, the concept of Relative Index stand out uniquely. A discerning student of classification could see in this concept, a seedling of the Thesaurofacet which developed almost nine decades after Dewey had introduced the Relative Index in his second edition of the Decimal Classification (DDC). Writing on the Relative Index in his introduction to the twelfth edition of DDC, Dewey commented, "the alfabetic index, the most important feature of the system, consists of headings gathered from a great variety of sources, as uzers of the sistem have found desirable in 54 years experience... The index containing 43,000 entries and constantly being enlarged by ading new subjects, aims to include all topics expressed or implyd in Tables, together with every corresponding sinonim likely to be sought, but does not include names of countries, towns, animals, plants, etc." [5]. An inherent nature of classification systems is the inevitable scattering of related ideas which are normally displayed under the appropriate hierarchies of the different facets of the subjects. Dewey intuitively realised that if his system was to serve the different purposes well the distributed relatives will have to be collected in a supplementary alphabetic index to the tables of the classes. Thus he made the classified and the alphabetic parts of DDC mutually supplementary and complementary, instead of making the index merely a location aid to the tables.

The paper attempts to study briefly the application of the Relative Index concept to the eighteen editions of DDC and also indicate that the concept of thesaurofacet is not entirely new or novel, but only a natural consummation of the concept of Relative Index.

DEVELOPMENT OF THE RELATIVE INDEX

The first edition of DDC was published in 1876 anonymously as "A classification and subject index for cataloguing and arranging the books and pamphlets of a library, consisting of less than 1000 three-digit numbers on ten pages and eighteen pages of index. Nine years later, in 1885 the second edition appeared with the title "Decimal classification and relative index" which contained 190 pages of the schedule and 80 pages of index. It was in this edition that Dewey introduced the Relative Index, reshaping his earlier subject index. In doing so, he maintained that the Relative Index was designed not merely for classing and arranging books on the shelves, but for cataloguing and indexing also and emphasised that the multiple uses of the DDC accounted for both the vastness and particularity of the index. The second edition carried 10,000 entries in the Relative Index as against 2000 in the first edition.

During the next 57 years, twelve more editions appeared at the interval of 2 to 12 years. These editions were prepared by Dewey himself, assisted by his colleagues and students. These editions followed closely the pattern set by the second edition, except that the schedules grew to 1046 pages and correspondingly the index to 737 pages and the auxiliary tables to 17 pages.

The thirteenth and the fourteenth editions that were published after Dewey's death did not change the basic structure of the index. The fourteenth edition index had some 61,000 entries.

The fifteenth standard edition stirred up considerable controversy with its two radical innovations viz., accepting the need for revision and broad classification. To give an idea of the reduction in size of this edition, there were 467 pages of tables, 191 pages of the index and 55 pages of the introductory matter. The index was not only drastically cut beyond all reasonable limits, but the strongest feature of DDC viz., its Relative index also was replaced by a specific index. Actually the title page of the fifteenth edition deleted the words "Relative Index".

The fifteenth edition, naturally, came in for scathing criticisms about its inadequacy and swerving too much from the original policy set by Dewey. A revision was inevitable, and the sixteenth edition came out after a good deal of preparation. The objectives, policies and procedures to be followed in the preparation of the schedules and the index were spelt out in detail. The earlier features of

DDC editions reappeared again. The Relative Index was in a separate volume which was very full and exhaustive.

With the tremendous growth of knowledge and the unprecedented proliferation of published materials, further editions of DDC were indispensable, and the seventeenth and the eighteenth editions followed. The seventeenth edition introduced a number of new and progressive features. The objectives of the index, it was thought, were relativity, reasonable and preferably reduced size, and increased significance of subject content. The new index, a radical departure from previous practice, received a hostile reception. In the earlier editions, for the subject occurring in the schedules, the index referred to the specific number; but in the seventeenth edition, the index referred to the class that includes the subject. This perhaps was an enriching practice but was unfamiliar to the users. In response to the bitter criticisms that the index was nonrelative and contained numerous deficiencies, a revised version of the Index was brought out, resembling more or less the earlier sixteenth edition. The revised index appeared in 1967 with 940 pages, 307 pages more than the original index of the seventeenth edition.

The eighteenth edition appearing in 1971 was in three volumes. The third volume comprising the index in 1037 pages, carried approximately 100,000 entries. The concept of 'relativity' was defined as "that property of the index which reverses the subordination of subject to discipline, thus bringing-together from all disciplines the various aspects of individual subjects". The index was considered relative because of its inverse relationship to the schedule. The index which was modelled along the lines of the first index to the seventeenth edition, retained its progressive features without slimming the index. With a detailed explanation of the structural presentation of the index, the eighteenth edition has given clear-cut guidelines for the future.

Appendix 1 gives a table containing some statistics on the size of the various editions of DDC.

Appendix 2 illustrates how the indexes to the last six editions of DDC have presented the entries for the same given subject.

Appendix 3 presents sample entries from the indexes to the seventeenth and eighteenth editions.

There has been considerable variations in the structure and presentation of the index, particularly in the last six editions. Nevertheless the basic concept of relativity was kept in tact, except in the fifteenth standard edition.

INFLUENCE ON OTHER SYSTEMS

Not only has the concept of relative index been experimented and developed in DDC, it has influenced other classification systems as well. The Universal Decimal Classification has an excellent relative index, particularly for its abridgement to the English edition (B.S. 1000). The Bibliographical Classification of Bliss, carries an exhaustive relative index. Bliss was highly critical of DDC and lashed out at its structural deficiencies, but was appreciative of the relative index. He, however, maintained that the structural weakness of a classification scheme cannot be made up even by an excellent relative index. Mills commenting on the index to the Bibliographic Classification says, "this index has been compiled with great thoroughness and is comparable to the famous relative index of DC".

As has been mentioned in an earlier section of this paper, Dewey intended his Relative Index to be used in the preparation of alphabetic subject index to a classified catalogue. Explaining the procedure for the derivation of subject headings using the relative index of DDC, Bhattacharyya demonstrates the preparation of contextual indexing, and hails it as a significant advancement in the area of subject indexing [1].

THESAUROFACET

The most concrete extension and refinement of the concept of relative index can be seen in the development of the thesaurofacet. The Thesaurofacet of the English Electric Co., the first of its kind, integrates the classification schedules and the thesaurus. Every term appearing in the schedule has a corresponding entry in the thesaurus. While a term is displayed in the most appropriate facet and hierarchy in the schedule, the thesaurus supplements and complements it by lisiting all the distributed relatives, representing equivalences, hierarchical and associative relationships. The thesaurus also serves as an alphabetic index to the schedule. The resulting thesaurofacet is a versatile and multipurpose tool as easily applicable to shelf arrangement as to pre-and post coordinate indexing and computerised retrieval systems. The two partz viz. the schedule and the thesaurus, can also be used independently. Thus the relative index concept reaches a logical consummation in the thesaurofacet.

An examination of the Relative Index to the eighteenth edition of DDC, reveals that most of its features, resemble very closely the thesaurus in the thesaurofacet. The equivalence, hierarchical and associative relationships of terms are displayed in the index as is normally done in a thesaurus. The following exemplifies the above statement to a certain extent:

Copper		
arts	RT	729.511
chemistry	BT	
inorganic	BT	546.652

organic	BT	547.056 52
technology	BT	661.065 2
construction	RT	
architecture	RT	721.044 73
building	RT	693.73
materials	RT	
building	RT	691.83
engineering	RT	620.182
foundations	RT	624.153 82
shipbuilding	RT	623.820 722
metallography	BT	699.953
metallurgy	BT	699.3
production economics	RT	338.476 693
mineral aspects	BT	
economic geology	BT	553.43
mineralogy	BT	549.23
production economics	RT	338.274 3
technology	RT	622.343
prospecting	RT	622.184 3
pharmacology	RT	615.265 2
products	NT	673.3
toxicology	RT	615.925 652

SOME OBSERVATIONS

From the foregoing rather cursory account, one can discern quite distinctly that the concept of relative index is a forerunner of the thesaurofacet, more precisely the thesaurus of the thesaurofacet. The past two decades have been witnessing a tremendous growth in the development of the information retrieval thesaurus and the future indicates its further growth. Classification systems, perhaps, will have a greater value and utility, if their alphabetic indexes form an integral parts of the systems as in a thesaurofacet.

In its dynamic growth over a century, DDC has been receptive to many new and progressive ideas, many of which have been incorporated in its design. As has been maintained in this paper that the relative index is only a presursor to the thesaurofacet, DDC could be developed into a thesaurofacet to make it versatile, which will be in tune with its dynamic character.

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Appendix 1

Table Showing the no. of pages and index entries

Edition	Date	Tables	Index	Index entries
1	1876	12	18	2,000
2	1885	162	86	10,000
3	1888	227	185	
4	1891	234	191	
5	1894	235	"	
6	1899	260	210	
7	1911	420	324	
8	1913	462	340	
9	1915	465	342	
10	1919	517	374	
11	1922	551	376	
12	1927	683	491	
13	1932	902	670	
14	1942	1048	799	61,000
15	1951	469	192	
15 Rev.	1952	"	402	
16	1958	1314	1004	
17	1965-67	1382	940	
18	1971	1628	1037	100,000

APPENDIX 2

Samples of an index entry

13th		14th		15th		15th, rev.	
Harmony		**Harmony**		Harmony	781.3	**Harmony**	781.3
music instruments	781.91	**architectural elevations**	729.13				
teknic	781.3	**plans**	729.23				
of colors optics	535.6	**drawing**					
painting	752	**composition**	741.434				
gospels Bible	226.1	**landscape**					
		art	712.25				
		music	781.3				
		of colors optics	535.6				
		painting	752.6				
		prestablished psychol	130.16232				

16th		17th		17th, rev.		18th	
Harmony		Harmony		Harmony		Harmony	
architectural design	929	arts see Composition		architectural design	729	interpretation	
color arts	752	Biblical		Bible gen. wks.	220.65	Bible	220.65
drawing composition	741.4	gen. wks.	220.65	color arts	752	s.a. spec.	
music	781.3	see also Spec. parts		drawing composition	741.4	parts of Bible	
				music	781.3	Hadith	297.124.065
				New Testament	225.65	s.a. spec. Hadith	
				Old Testament	221.65	Koran	297.122.65
						spec. parts	297.122 9
						Midrash	296.140 65
						s.a. spec. works	
						music theory	781.3
						spec. forms	781.5
						s.a. spec.	
						mediums	
						s.a. other spec. subj.	

APPENDIX 3

Samples of entries in 17th and 18th editions

17th Ed.		18th Ed.	
Ganglions		Ganglions	
human anatomy	611.83	autonomic system see Autonomic nervous system	
human physiology		basal	
autonomic nervous system	612.89	diseases	616.83
peripheral nervous system	612.81	geriatrics	618.976 83
		pediatrics	618.928 3
Gangrene		pub. health	614.598. 3
surgical treatment	617.2	statistics	312.383
symptomatology	616.072	deaths	312.268 3
veterinary surgery	636.089 72	other aspects see Diseases	
specific animals	636.1-.9	cranial nerves see Cranial nerves	
		spinal nerves see Spinal nerves	
Gangs		other aspects see Nerves	
boys juvenile delinquency	364.363		
criminology	364.37	Gangrene	
girls juvenile delinquency	364.364	symptomatology see Symptomatology	
social psychology	301.185		
		Gangs	
Gangsterism labour unions criminology	363.132	sociology see Small groups	
Gannets zoology	598.43	Gangsterism	
		soc. path	364.106 6
Ganoids			
paleozoology	567.4	Gannets see Pelecaniformes	
zoology	597.42		
		Ganoids see Polypterini	
Gaols penology	365.3		
		Goals see Penal institutions	

THE FIRST EDITION AND ALL THE EIGHTEEN EDITIONS - A review

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The Forest Press Division of the Lake Placid Education Foundation has brought out two publications to mark the first hundred years of use of the most widely used scheme of library classification. There is no doubt that this is an important event and there could hardly be a better way of celebrating this great event than to present these two publications to the world community of librarians and other information workers. The publications are:

1. *A classification and subject index for cataloguing and arranging the books and pamphlets of a library. Amherst (Mass.), 1876. 44p. (Dewey Decimal Classification Centennial 1876-1976. Facsimile reprinted by Forest Press. 1976).*

2. *The eighteen editions of the Dewey Decimal Classification, by John Phillip Comaromi. Albany, Forest Press, 1976. xiv, 678p. ISBN 0-910608-17-2.*

The first edition of the DDC, published hundred years ago, can have hardly any practical utility to-day. But, it must be having great sentimental value for all information workers. We have been told and we are aware that the DDC had a very modest beginning. However, the present generation of librarians who are familiar with the multi-volume eighteenth edition of the scheme could hardly visualise how modest the beginning could be. The present reviewer, at least, and a number of others in the profession around him, both his seniors and juniors, had not seen a copy of the first edition so far and hence had only a vague idea of it. The present fascimile reprinted volume was, naturally, an object of great curiosity. For many more this will be so.

The first edition, as reprinted, is a slim volume of just 44 pages, including the title page. The title page does not carry the name of Melvil Dewey nor the Preface is signed. The name appeares only on the back of the title-page as the person holding the copyright of the publication. The Preface occupies a substantial 8 pages (from p. 3 to 10) of closely printed matter. From page 13 begins the actual schedule which extends upto page 22, a page each for the ten Main Classes. The Subject Index, as it is called, occupies 18 pages, from page 23 to 40. The last four pages features end matters like Explanations and Subject Catalogue.

The Preface remains even today an important source of information for studying the origin and growth of DDC also the first, yet firm, pronouncement of the epoch-making changes that Dewey wanted to introduce, in library management, through his scheme of classification. It is remarkable how clear Dewey was on some points which have only recently become part of our general theory of classification. As for example, let us take Dewey's idea on Mnemonics. He wrote in the Preface: "The arrangement of headings has been sometimes modified to secure mnemonic aid in numbering and finding books without the Index. For instance, the scheme is so arranged that China has always the number 1. In Ancient History, it has the first section, 931: in Modern History, under Asia, it has 951: in Philology, the Chinese language appears as 491... The Italian 5, for instance, will be noticed in 35, 55, 450, 755, 850, and 945. This mnemonic principle is specially prominent in Philology and Literature and their divisions, and in the form distinctions used in the first 9 sections of each class. ... Users of the scheme will notice this mnemonic principle in several hundred places in the classification, and will find it of great practical utility in numbering and finding books without the aid of Catalogue or Index, and in determining the character of any book simply from its call number as recorded on the book, on all its catalogue and cross reference cards, on the ledger, and in the check box".

Even if told emphatically one would hardly believe that the above was written hundred years ago. Only the Preface makes us believe it to be so.

To appreciate the novelty of the DDC, we must remember that the scheme was a part of a bigger plan to improve the organisation and services of libraries. The scheme introduced the idea of relative location of books on shelves, which, though common place now, was revolutionary in those days. Moreover, the scheme was to be used in the preparation of classed catalogues, arrangement of shelf lists, issue records, pamphlet cases, newspaper clippings and so on. For each of these ideas and uses, Dewey provided some explanation in the Preface.

On the advantages of relative location, Dewey said "Parts of sets, and books on the same or allied subjects, are never separated as they are sure to be, sooner or later, in every library arranged on the common plan, unless it be frequently re-arranged and re-catalogued. The great expense of this re-cataloguing makes it impracticable except for a few very wealthy libraries. In this system the catalogue and book numbers remain unchanged through all changes of shelving, buildings, or arrangement". He said in another place, on the same point, "Thus all the books on any given subject are found standing together, and no additions or changes ever separate them. Not only are the books on the subject sought, found together, but the most nearly allied subjects precede and follow, they in turn being preceded and followed by other allied subjects as far as practicable". To highlight the advantage of relative location, Dewey, again and again, referred to the flexibility of card catalogue. As for example, he said, "In arraning the books on the shelves, the absolute location by shelf and book number is wholly abandoned, the relative location by class and book number being one of the most valuable features of the plan. The class number serves also as the location number and the shelf number in common use is entirely dispensed with ... New books as received are numbered and put into place, in the same way that new titles are added to the card catalogue". Again, in another paragraph, he said "As in the card catalogue system, there is room for idefinite expansion without devices or provisions. Space is the only requisite and if the shelf room is exhausted, the floor space is equally good, except for the inconvenience of stooping".

On the use of the scheme in the organisation of pamphlets in a library, Dewey had this to say: "These class numbers applied to pamphlets have proved specially satisfactory. The number is written on the upper left corner and the pamphlets are arranged either in pamphlet cases with the books on the same subject or on special shelves... As each pamphlet is examined when received into the library, it is the work of a single moment to pencil on it its class number. There is no expense whatever incurred, and yet the entire pamphlet resources of the library on any subject can be produced almost instantly".

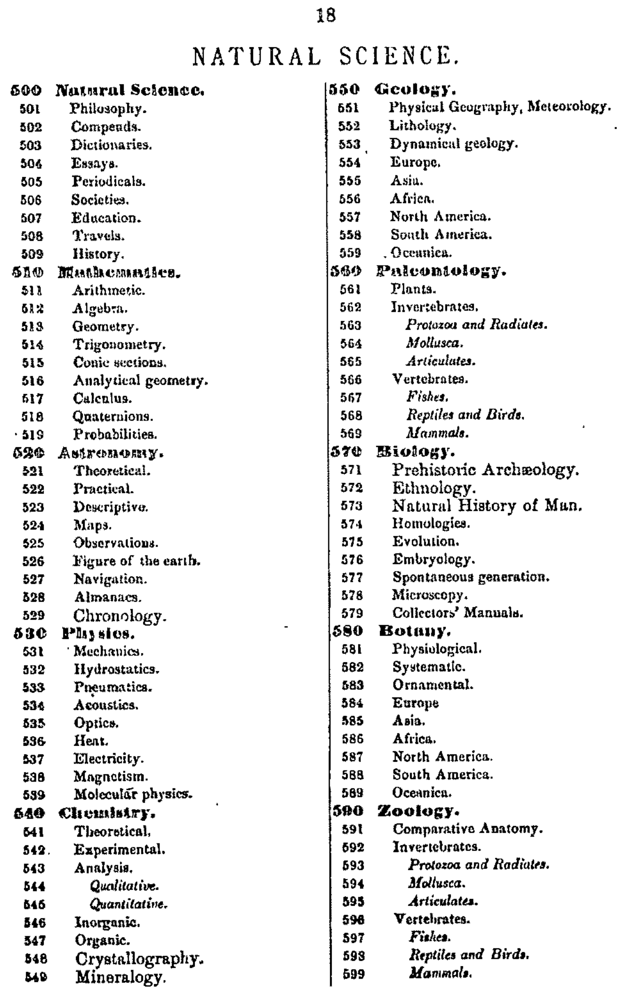
Coming to the actual tables or schedule one finds that the first edition had only ten pages in all, devoted to the ten main classes. Compared to the recent editions, the headings or the names-of-subjects were brief and simple. In fact in most cases the headings were single-worded. This was done with a purpose. As Dewey explained, "In naming the headings, brevity has been secured in many cases at the sacrifice of exactness. It was thought more important to have short, familiar titles for the headings than that the names given should express with fullness and esactness the character of all books catalogued under them".

Since the headings were brief a user of the scheme could easily get the impression that a number of subjects were omitted. To take care of this situation Dewey made the Index quite elaborate and cautioned in the Preface, "Many subjects, apparently omitted, will be found in the Index, assigned, with allied subjects, to a heading which bears the name of the most important only. Reference to this Subject Index will decide at once any doubtful points". Thus, one does not find, for example, any mention of diseases, such as, cancer, cholera, dysentery, measles etc, in the schedule but they are all mentioned in the Index and are assigned to the class 616-Pathology, theory and practice. Similarly, the Index shows that books on Gold can be assigned 549 (Mineralogy) or 671 (Metals). A number of synonymous terms are also taken care of in the Index.

Through the scheme, Dewey wanted a number of innovations to be introduced in library practice. As for example, he wanted fuller entries to be made under subjects. He wrote in the Preface, "The custom of giving full titles, etc., under authors, and only references or very brief titles under subjects, has been reversed. A reader seeking a book of a known author, in the vast majority of cases, wants simply the number by which to call for it, and can find it much sooner in a brief title catalogue. In the rare cases where more is needed the class number refers instantly to all these facts on the cards. On the other hand, a reader seeking books on a known subject, needs the full title, imprint, cross-references, and notes, to enable him to choose the book best suited to his wants".

It must have been noted that in the above paragraphs the present reviewer has quoted extensively from the Preface. That has been irresistible. The idea was to bring out the richness of the Preface in the then prevailing condition of library practice. In fact the Preface can still be considered a classic in library literature. So far as the scheme itself is concerned, it has now vastly changed reflecting the rapid development of the subjects themselves over the last hundred years. Looking at the mere ten-page schedule of the first edition, one is sure to ponder over the infinite adaptability of the original framework that has been able to absorb the vast changes in the subjects. The present facsimile reprinted first edition of DDC will be very enthusiastically received by all librarians and information workers.

If, going through the first publication, namely, the facsimile reprinted first edition of DDC one gets the feeling that he is looking at an artistic creation of a great master, then the second publication, by Comaromi, will give him the feeling that

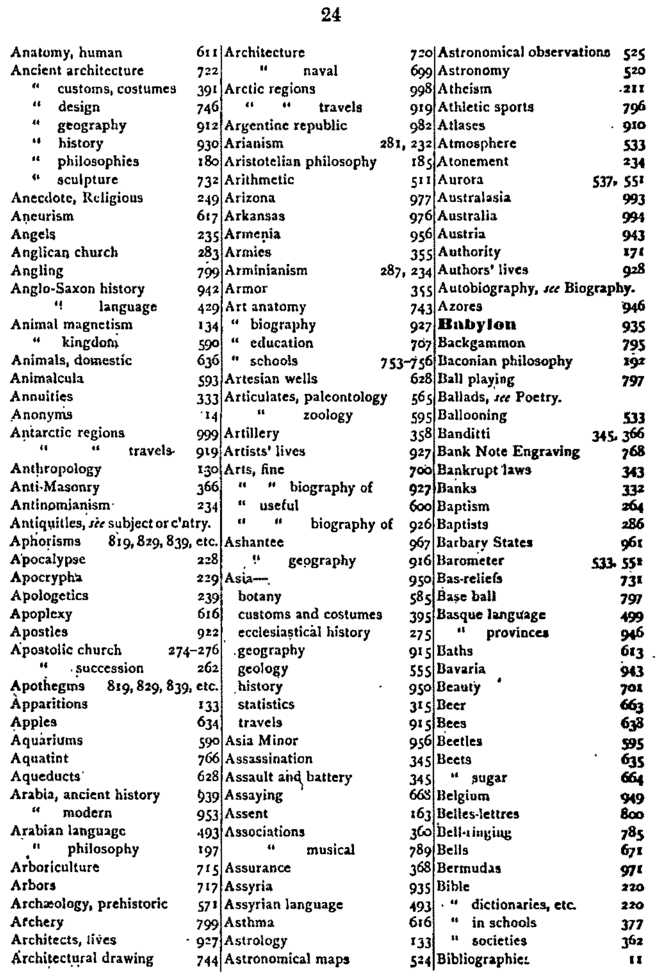


18

NATURAL SCIENCE.

500 Natural Science.
501 Philosophy.
502 Compends.
503 Dictionaries.
504 Essays.
505 Periodicals.
506 Societies.
507 Education.
508 Travels.
509 History.
510 Mathematics.
511 Arithmetic.
512 Algebra.
513 Geometry.
514 Trigonometry.
515 Conic sections.
516 Analytical geometry.
517 Calculus.
518 Quaternions.
519 Probabilities.
520 Astronomy.
521 Theoretical.
522 Practical.
523 Descriptive.
524 Maps.
525 Observations.
526 Figure of the earth.
527 Navigation.
528 Almanacs.
529 Chronology.
530 Physics.
531 Mechanics.
532 Hydrostatics.
533 Pneumatics.
534 Acoustics.
535 Optics.
536 Heat.
537 Electricity.
538 Magnetism.
539 Molecular physics.
540 Chemistry.
541 Theoretical.
542 Experimental.
543 Analysis.
544 *Qualitative.*
545 *Quantitative.*
546 Inorganic.
547 Organic.
548 Crystallography.
549 Mineralogy.
550 Geology.
551 Physical Geography, Meteorology.
552 Lithology.
553 Dynamical geology.
554 Europe.
555 Asia.
556 Africa.
557 North America.
558 South America.
559 Oceanica.
560 Paleontology.
561 Plants.
562 Invertebrates.
563 *Protozoa and Radiates.*
564 *Mollusca.*
565 *Articulates.*
566 Vertebrates.
567 *Fishes.*
568 *Reptiles and Birds.*
569 *Mammals.*
570 Biology.
571 Prehistoric Archæology.
572 Ethnology.
573 Natural History of Man.
574 Homologies.
575 Evolution.
576 Embryology.
577 Spontaneous generation.
578 Microscopy.
579 Collectors' Manuals.
580 Botany.
581 Physiological.
582 Systematic.
583 Ornamental.
584 Europe
585 Asia.
586 Africa.
587 North America.
588 South America.
589 Oceanica.
590 Zoology.
591 Comparative Anatomy.
592 Invertebrates.
593 *Protozoa and Radiates.*
594 *Mollusca.*
595 *Articulates.*
596 Vertebrates.
597 *Fishes.*
598 *Reptiles and Birds.*
599 *Mammals.*

A page from the schedule of the first edition of DDC published in 1876.



24

Anatomy, human	611	Architecture	720	Astronomical observations	525
Ancient architecture	722	" naval	699	Astronomy	520
" customs, costumes	391	Arctic regions	998	Atheism	211
" design	746	" " travels	919	Athletic sports	796
" geography	912	Argentine republic	982	Atlases	910
" history	930	Arianism	281, 232	Atmosphere	533
" philosophies	180	Aristotelian philosophy	185	Atonement	234
" sculpture	732	Arithmetic	511	Aurora	537, 551
Anecdote, Religious	249	Arizona	977	Australasia	993
Aneurism	617	Arkansas	976	Australia	994
Angels	235	Armenia	956	Austria	943
Anglican church	283	Armies	355	Authority	171
Angling	799	Arminianism	287, 234	Authors' lives	928
Anglo-Saxon history	942	Armor	355	Autobiography, *see* Biography.	
" language	429	Art anatomy	743	Azores	946
Animal magnetism	134	" biography	927	**Babylon**	935
" kingdom	590	" education	707	Backgammon	795
Animals, domestic	636	" schools	753–756	Baconian philosophy	192
Animalcula	593	Artesian wells	628	Ball playing	797
Annuities	333	Articulates, paleontology	565	Ballads, *see* Poetry.	
Anonyms	14	" zoology	595	Ballooning	533
Antarctic regions	999	Artillery	358	Banditti	345, 366
" " travels	919	Artists' lives	927	Bank Note Engraving	768
Anthropology	130	Arts, fine	700	Bankrupt laws	343
Anti-Masonry	366	" " biography of	927	Banks	332
Antinomianism	234	" useful	600	Baptism	264
Antiquities, *see* subject or c'ntry.		" " biography of	926	Baptists	286
Aphorisms	819, 829, 839, etc.	Ashantee	967	Barbary States	961
Apocalypse	228	" geography	916	Barometer	533, 551
Apocrypha	229	Asia—	950	Bas-reliefs	731
Apologetics	239	botany	585	Base ball	797
Apoplexy	616	customs and costumes	395	Basque language	499
Apostles	922	ecclesiastical history	275	" provinces	946
Apostolic church	274–276	geography	915	Baths	613
" succession	262	geology	555	Bavaria	943
Apothegms	819, 829, 839, etc.	history	950	Beauty	701
Apparitions	133	statistics	315	Beer	663
Apples	634	travels	915	Bees	638
Aquariums	590	Asia Minor	956	Beetles	595
Aquatint	766	Assassination	345	Beets	635
Aqueducts	628	Assault and battery	345	" sugar	664
Arabia, ancient history	939	Assaying	668	Belgium	949
" modern	953	Assent	163	Belles-lettres	800
Arabian language	493	Associations	360	Bell-ringing	785
" philosophy	197	" musical	789	Bells	671
Arboriculture	715	Assurance	368	Bermudas	971
Arbors	717	Assyria	935	Bible	220
Archæology, prehistoric	571	Assyrian language	493	" dictionaries, etc.	220
Archery	799	Asthma	616	" in schools	377
Architects, lives	927	Astrology	133	" societies	362
Architectural drawing	744	Astronomical maps	524	Bibliographies	11

A page from the Subject Index of first edition of DDC published in 1876.

he has before him a masterly commentary from a great art critic. Looking at the scheme of classification as a final product, one can hardly imagine the dark controversy and red-blooded passion that the scheme had generated after its publication and through the editions. All that is vividly captured in this study. The publication is a history of DDC. As the author has put it, "In spite of the DDC's long and healthy life, however, its full story has never been told. There have been biographies of Dewey that briefly describe his system, but this is the first attempt to provide a detailed history of the work that more than any other has spurred the growth of librarianship in this country and abroad".

The author had started the work as a research project in the University of Michigan and the present study is a revision of his earlier thesis. This study is an edition-by-edition commentary of the development of DDC from a 42-page slim anonymous first edition to the present 2718-page massive eighteenth edition. There is one chapter for each of the eighteen editions. with third, fourth, fifth editions put together in a single chapter, and additional chapters on the Idea, The First Decade: 1876-1885, The Duet: Schwartz and Perkins, and Foreign Entanglement. Nearly a third of the book is devoted to the first two editions. The reason for this emphasis, as stated by the auther, is, "the structure of knowledge set forth in the first. and even more so in the second edition is essentially the same as that found in subsequent editions".

In the compilation of the history of the DDC, the author has used extensively the primary material available in three important sources namely, the Melvil Dewey Collection at the Columbia University, the files of the Forest Press at Albany, and the editorial files at the Decimal Classification Division of the Library of Congress. This has given a measure of authenticity to the study which is not available in any other work.

The present reviewer feels that the best way to bring out the richness of the contents and exposition of this publication would be to quote from its pages. In fact, one can hardly resist the temptation when one has before him a study of such absorbing interest. In the first chapter, The Idea, Comaromi discusses mainly how Dewey got the idea of using Arabic numerals decimally to number the subjects of books. He examines all the probable sources, Dewey's own explanations, and what others have said on this point. The probable influence of other classification schemes, such as, the Nuovo Sistema of the Italian bookseller Natale Battezzati, the plan of the St. Louis Public School Library devised by William T Harris, a similar plan for the Apprentices Library of New York devised by Jacob Schwartz, a scheme for the arrangement of the centennial exhibits by William Phipps Blake and other philosophic schemes are examined.

The author, after examining all evidence carefully, says: "We will never be certain upon this point, but I suspect that Dewey did draw upon Harris' scheme, or Schwartz's, or, in all likelihood, upon both. The chapter ends with the important conclusion:".... the outline of the DDC is based on the scheme that William Torrey Harris prepared... in my opinion the evidence is strong that Hegel provided the philosophic underpinnings of Harris' classification, and thus of Dewey's."

The second chapter is on the first edition of the DDC. The author discusses mainly the logic behind the sequence of the main classes and their subdivisions. This is important because this logical foundation was to support a huge superstructure that was built up through the subsequent editions. The sequence and divisions of the classes were suggested by various authorities from Amherst This gave the scheme an 'academic cast' from the beginning. Placing the tenth class, unnamed in the first edition, which is now called Generalia at the beginning, has been claimed by the author, was a good example of Dewey's practicality'.

There are long commentaries on all the subjects. Only a few can be mentioned or quoted here. On the class 300- Sociology, the author makes the following general comment: "Sociology, 300, would become Social Sciences, 300, when the focus of the term "sociology" would narrow and come to mean the academic discipline it is today. As God has been less annoying to man than man has been to himself, it is not surprising that it was even more difficult to devise a classification for sociology the science of society, than it was for theology. Man's unpredictable desires, interests, and views created problems, as did the vast literature on the subject". Apart from such words of profound wisdom, there are many objective criticisms on the order of subjects. Consider, for example, the following comments on the class 330-Political Science. "Political Economy, 300, or'economics' as it is now called, possessed a logical structure, but it suffered from overlapping as well as from a fracturing of some subjects. Political Economy was the science which concerned itself with the production, distribution, and consumption of things having an exchangeable value, with particular reference to the effects of such production, distribution, and consumption upon the national wealth and welfare. Thus 331-334 dealt with the production of wealth, 335-337 with the distribution of wealth. Production, 338, was out of order and perhaps should not have been assigned since it was a subdivision of Capital and Labor, 331. Consumption did not receive a number, which is not surprising since the economics of consumption has gained significance only recently. It was logical for Pauperism, 339, to follow distribution, for pauperism was, after all, the result of a malfunction in the system of distribution".

One would naturally like to know what exactly was the impact of the publication of the DDC in the library world? We must remember that the DDC was introduced not merely as a scheme of classification but as a time-saving device in the processing of books in libraries, specifically, and in library management in general. This is discussed in the third chapter, entitled the First Decade 1876-1885.

Perhaps, the first significant impact was that the controversy between fixed location and relative location of books on shelves came to a head. Librarian who had to manage large collections defended the old practice of fixed location with shelf-mark for some time. But they found their adversaries, both Dewey and Cutter being in the rank, too strong. It may be recalled that the period also saw the formation of the first professional association of librarians, namely, the American Library Association and also the launching of the professional organ the Library Journal. All these provided scope for organised professional discussions and debates. The DDC became immediately a subject of discussion. There were sharp criticisms on several points. Cutter was a strong critic. He said that he wanted to apply the DDC to the Boston Athenaeum but soon became dissatisfied "because minute classification led to very high figures, and because it seemed that limiting the classes to ten and their divisions to ten each had cramped the mind of the classifier and prevented his fully developing his subject".

Division of a subject into ten at every point was criticised by many. But Dewey held on to the principle for reasons of utility and practicality. He answered: "A few cases where a little special effort was made to fit the decimals have proved entirely satisfactory in use. If we had six necessary heads we made ten by subdividing four of the largest. The other method would have been to leave four numbers blank. In practice it is more convenient to have them divided, and any question of theory we esteem less than utility..."

The first decade saw not only a greater interest in classification but the publication of a number of classification schemes. The classifications of Cutter and Schwartz were published during this period. The DDC was instrumental in getting certain basic ideas cleared and accepted. This helped the progress of classification along right lines.

With the abandonment of the shelf-mark system, a new mechanism became necessary for providing a unique number to each book, on the shelf, with which it could be retrieved. This gave rise to the consideration of a suitable book numbbering system. The first decade also saw the acceptance of DDC in a number of important American libraries. The first such library, after the Amherst, was the Young Men's Association of Buffalo which changed over in 1878. The chapter, The First Decade, vividly portrays all these developments.

The next chapter is on the Second Edition: 1885. As has been said previously the author devotes considerable space to the second edition. This edition had grown to 314 pages from 42 pages in the first edition. It contained the largest number of changes between any two consecutive editions. The general interest in classification and many of the new ideas in classification that were introduced, for which Dewey himself was responsible to a large extent, were sought to be satisfied through the second edition. The concepts, such as, the common subdivisions, the Generalia Class, mnemonic notations, etc. became much more explicit now. A number of classes with four, five, and six digits were introduced. The much too familiar number-building note 'divide-like' was also introduced for the first time in the second edition. A number of subjects had to be relocated, which must have caused considerable difficulty to those librarians who were using the earlier edition. To assure the librarians that such large scale relocations will not be introduced in the future editions, Dewey wrote, "Librarians making the necessary changes for the revised edition need not fear that a series of editions have begun each of which will call for such changes..." This promise of the 'integrety of numbers' became an important editorial policy to be followed in the subsequent editions.

The author of the book has very appropriately said elsewhere, "The first edition had been promising. The second edition was the promise fulfilled and probably the most prominent landmark in the development of American library classification." However, it is strange that the bitterest critics of DDC were also active immediately after the publication of the second edition. Perhaps, the most unmerciful critics were Jacob Schwartz and Frederic Perkins. They called themselves as the Duet. The dark controversy of this period is vividly captured in the chapter entitled The Duet.

At times it is complained that Dewey did not 'adequately refute the Duet charges'. Perhaps, it was not necessary as the success of the DDC was the best answer to most of the criticisms. It is significant that the third edition was published in 1888, just three years after the second edition. This, surely, is an index of the success of the scheme. It may be pointed out that Dewey edited only the first three editions.

With the fourth edition a new era began. The revisions were by editors other than Melvil Dewey. The first editor of this new era was May Seymour, who was editor for thirty years and had seen through eight new editions (upto the eleventh). The next editor was Dorkas Fellows, another close associate of Dewey, who edited the next three editions. The last edition, that Dewey saw, was the twelfth edition edited by Dorkas Fellows.

Chapter 11 is on Foreign Entanglement. It is mainly devoted to the working of the International Institute of Bibliography in the context of adaptation of DDC for the UDC, agreements between the two agencies, gradual divergence between the two schemes, and the opinions of the editors. This was surely an important era in the history of DDC.

The next seven chapters are on the next seven (twelfth through eighteenth) editions. The chapter on the fifteenth Standard edition, the most controversial of all the editions, is interesting. How this edition was conceived and executed, that caused the 'flight from Dewey' and wrecked the scheme financially, are all discussed in this chapter.

The above was just an attempt to bring out the richness of the contents of this interesting study. Surely, the publication presents the most comprehensive history of the DDC. There can hardly be any doubt that librarians all over the world will welcome this publication.

DEWEY DECIMAL CLASSIFICATION IN HINDI

B Guha
Insdoc, New Delhi-12

Yes, it is a reality now! In a recent article by David Batty (Quart. J. Lib. Congress 1976, 33, 300-10) it has been mentioned that DDC translations exist, of full or abridged editions, in Afrikaans, Arabic, French, Hebrew, Indonesian, Korean, Malayan, Sinhala, Spanish, Thai, Turkish, and Vietnamese, in addition to a number of adaptations in other languages. Very appropriately the article also displays the title pages of DDC in seven different languages. David Batty's article could not include in its list the Hindi version. But one can imagine that even when the said article was being written preparations were going on to bring the Hindi edition before the end of the centenary year of DDC.

The Hindi edition of DDC has been published by the Forest Press, Lake Placid Education Foundation, printed by the Catholic Press, Ranchi, India and translated and edited by Dr. Prabhu Narayan Gour of Patna. The Hindi version is based on the current that is, the eighteenth edition of the DDC. The work is in a single volume of 701 pages. The title brings out clearly that the work is of a selective nature.

Selection, naturally, has to be in the context of Indian libraries and their needs. The translator has not spelt out how exactly the needs have been assessed. However, one thing is certain that the work of selection must have been an extremely difficult work. The extent of selection can be best brought out by an example only. The following extracts from the Sociology schedules from both the original 18th edition and Hindi edition may be compared:

Table 1 - A portion of the Sociology Schedule

301.4	Social structure
	.
	.
	.
.42	Marriage and family
.421	Structure and functions of family
.421 2	Nuclear family Parents and children
.421 3	Consanguine (Extended) family
.422	Types of marriage Class interracial, intercultural, interreligious marriages [all formerly 301.422] in 301.429
.422 2	Monogamy
.422 3	Polygamy (Plural marriage)
.423	The family and social change
.426	Family planning Former heading: Husband-wife relationship Class marital sexual relations in 301.418, general husband-wife relationships in 301.427 [both formerly 301.426]
.427	Intrafamily relationships Class here remarriage [formerly 301.4285], general husband-wife relationships [formerly 301.426], parent-children relationships Class family planning in 301.426, marriage counseling in 362.82, child care and training in 649.1 For marital sexual relations, see 301.418
[.427024]	Works for specific types of users Do not use; class in 301.4272
.4272	Guides, manuals, advice for specific types of users Add "Persons" notation 03-99 from Table 7 to base number 301.4272
.428	Family dissolution Including separation and desertion
.428 4	Divorce
[.4285]	Remarriage Class in 301.427
.4286	Death

.429	Interracial, intercultural, interreligious marriages [*all formerly* 301.422]
.43	Specific age levels
.431	Minors
.4314	Children Thru age eleven
.431 5	Adolescents Ages twelve to twenty
.434	Mature and middle aged persons
.435	Aged persons Including retirement
.44	Social classes For class conflict, *see* 301.637
.4404	General special
.44044	Social mobility

301

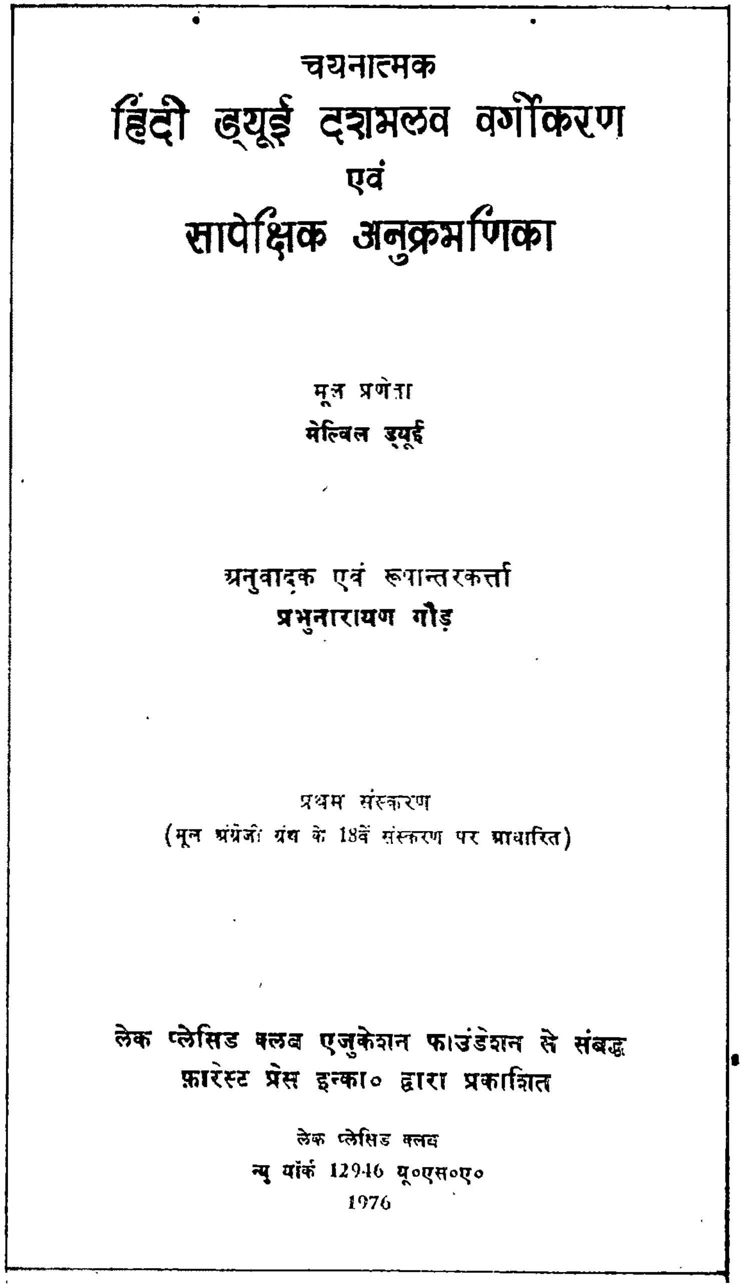
.415	दाम्पत्येतर और अपसामान्य यौन-संबंध Extra-marital & abnormal sexual relations
.415 2	विवाहपूर्व यौन-संबंध Premarital relations
.415 3	जारकर्म Adultery
.415 4	वेश्यावृत्ति Prostitution
.415 7	समलिंग-कामुकता Homosexuality
.417	यौन आचरण, स्वभाव और नैतिक स्थिति Sexual behavior, habits, moral conditions
.418	दाम्पत्य यौन-संबंध Marital sexual relations –यहां यौन-शिक्षा संबंधी निर्देशिकाओं और हस्त-पुस्तिकाओं इत्यादि का वर्गीकरण कीजिए
.42	विवाह और कुटुंब Marriage & family
.421	कौटुंबिक संरचना और कर्त्तव्य Structure & functions of family
.422	विवाह के प्रकार Types of marriage
.423	कुटुंब और सामाजिक परिवर्तन The family & social change
.426	परिवार-नियोजन Family planning
.427	आंतरकौटुंबिक संबंध Intrafamily relationships (सामान्य पति-पत्नी संबंध, माता-पिता और बच्चों का संबंध इत्यादि)
.428	कौटुंबिक विघटन Family dissolution
.428 4	विवाह-विच्छेद (तलाक़) Divorce
.429	अंतर्जातीय, अंतसंस्कृतिक और अंतर्धार्मिक विवाह Inter-racial, inter-cultural, inter-religious marriages
.43	विशिष्ट वर्ग-स्तरीय कौटुंबिक सदस्य Specific age-levels (बच्चे, किशोर, प्रौढ़, वयोवृद्ध इत्यादि)
.44	सामाजिक वर्ग Social classes
.441	आर्थिक स्थिति और सम्पत्ति-अधिकार पर आधारित वर्ग Classes determined by economic status & ownership (निर्धन, मध्यवर्गीय, धनिक इत्यादि)
.442	परिवार और गोत्र-संबंध आधारित वर्ग Classes determined by family & by kinship ties
.443	वासस्थान की स्थिति और कालावधि आधारित वर्ग Classes determined by location & duration of residence
.444	वृत्ति-व्यवसाय आधारित वर्ग Classes determined by occupation

Even a cursory glance will reveal that the Hindi schedule is much shorter. In general, it can be seen, most of the classes with seven-digited numbers have been dropped. In the above portion of the schedule, the only exception to this policy of selection is the class 301.4284-Divorce. It will also be observed that a number of scope notes, relocation notes, and other instructions are not available in the Hindi schedule. Relocation notes have been avoided, apparently on the logic that this is the first edition. It may also be mentioned here that the Hindi edition does not include auxilliary Table 7 (Persons). Hence, the notes directing the use of Table 7 in the original edition have been eliminated.

It has to be pointed out that adaptation in the Hindi edition does not mean reduction of the original schedules in all places. There are a number of areas where the schedules have been considerably expanded. As is known, some of the Indian libraries which have been using the DDC have for their own convenience expanded the Dewey schedules in area like philosophy, relegion, linguistics, history, geographical divisions, art and architecture, etc. Many of these expanded schedules have been discussed in meetings and some of them also published in Indian library journals. Dr Gour says in the Introduction that such works have been taken into consideration in expanding some portions of the schedule where Indian libraries require more detailed schedule. To appreciate the extent of expansion some of the classes under 954 - South Asia, India, may be compared.

954	South Asia India
.02	Asian dynasties and European penetration, 647-1774
.021	Early period, 647-997
.022	Moslem conquests, 977-1206
.023	Slave kings, Khalji and Tughluk dynasties, 1206-1413
.024	Sayyid and Lodi dynasties, 1413-1526
.025	Mogul Empire, 1526-1707
.029	European penetration 1707-1774
.03	British rule, 1774-1947
.031	East India Company, 1774-1858
.0317	Sepoy Mutiny, 1857
.035	Control by crown, 1858-1947
.04	Independence and partition, 1947-
.9	Pakistan

In the Hindi edition the above portion of the schedule has been very much expanded to take care of the requirements of big libraries. It extends to more than six pages. Only a small portion of this expanded schedule can be reproduced here.



चयनात्मक
हिंदी ड्यूई दशमलव वर्गीकरण
एवं
सापेक्षिक अनुक्रमणिका

मूल प्रणेता
मेल्विल ड्यूई

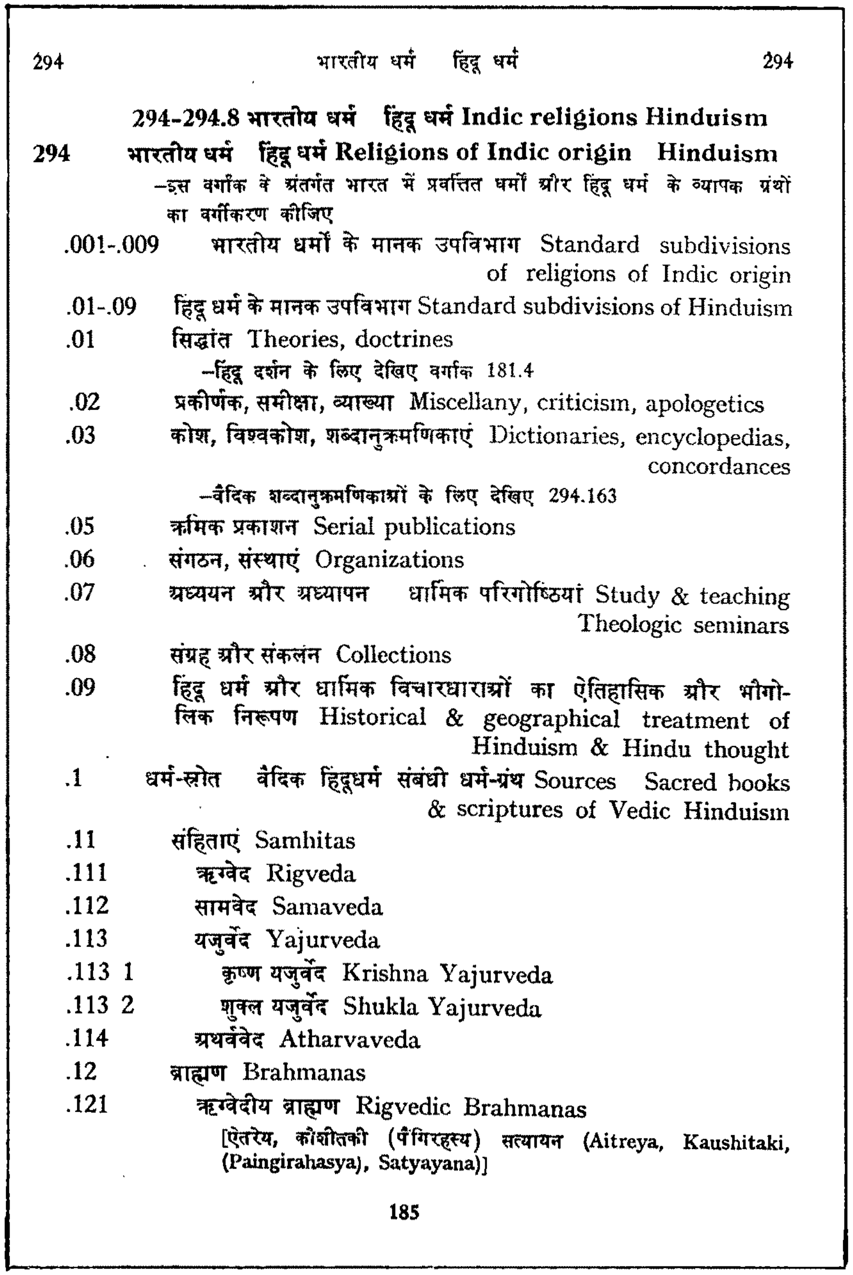
अनुवादक एवं रूपान्तरकर्त्ता
प्रभुनारायण गौड़

प्रथम संस्करण
(मूल अंग्रेजी ग्रंथ के 18वें संस्करण पर आधारित)

लेक प्लेसिड क्लब एजुकेशन फाउंडेशन से संबद्ध
फ़ारेस्ट प्रेस इन्का० द्वारा प्रकाशित

लेक प्लेसिड क्लब
न्यु यॉर्क 12946 यू०एस०ए०
1976

Title page of the first Hindi edition of Dewey Decimal Classification published in 1976 by the Forest Press, Lake Placid Education Foundation.



294 भारतीय धर्म हिंदू धर्म 294

294-294.8 भारतीय धर्म हिंदू धर्म Indic religions Hinduism

294	**भारतीय धर्म हिंदू धर्म Religions of Indic origin Hinduism**
	–इस वर्गांक के अंतर्गत भारत में प्रवर्तित धर्मों और हिंदू धर्म के व्यापक ग्रंथों का वर्गीकरण कीजिए
.001-.009	भारतीय धर्मों के मानक उपविभाग Standard subdivisions of religions of Indic origin
.01-.09	हिंदू धर्म के मानक उपविभाग Standard subdivisions of Hinduism
.01	सिद्धांत Theories, doctrines
	–हिंदू दर्शन के लिए देखिए वर्गांक 181.4
.02	प्रकीर्णक, समीक्षा, व्याख्या Miscellany, criticism, apologetics
.03	कोश, विश्वकोश, शब्दानुक्रमणिकाएं Dictionaries, encyclopedias, concordances
	–वैदिक शब्दानुक्रमणिकाओं के लिए देखिए 294.163
.05	क्रमिक प्रकाशन Serial publications
.06	संगठन, संस्थाएं Organizations
.07	अध्ययन और अध्यापन धार्मिक परिगोष्ठियां Study & teaching Theologic seminars
.08	संग्रह और संकलन Collections
.09	हिंदू धर्म और धार्मिक विचारधाराओं का ऐतिहासिक और भौगोलिक निरूपण Historical & geographical treatment of Hinduism & Hindu thought
.1	धर्म-स्रोत वैदिक हिंदूधर्म संबंधी धर्म-ग्रंथ Sources Sacred books & scriptures of Vedic Hinduism
.11	संहिताएं Samhitas
.111	ऋग्वेद Rigveda
.112	सामवेद Samaveda
.113	यजुर्वेद Yajurveda
.113 1	कृष्ण यजुर्वेद Krishna Yajurveda
.113 2	शुक्ल यजुर्वेद Shukla Yajurveda
.114	अथर्ववेद Atharvaveda
.12	ब्राह्मण Brahmanas
.121	ऋग्वेदीय ब्राह्मण Rigvedic Brahmanas [ऐतरेय, कौशीतकी (पैंगिरहस्य) सत्यायन (Aitreya, Kaushitaki, (Paingirahasya), Satyayana)]

185

A page from the first Hindi edition of Dewey Decimal Classification showing a part of the schedule on Hinduism.

.023 4	तुग़लक़ वंश, 1320-1414 Tughlak dynasty
.023 5	सैयद वंश, 1414-1451 Sayyid dynasty
.023 6	लोदी वंश, 1451-1526 Lodi dynasty
.023 7	सूर वंश, 1540-1555 Sur dynasty
.023 71	शेरशाह, 1540-1545 Shershah
.024	दक्षिण भारत के स्वतंत्र राज्य Independent kingdoms of South India
.024 1	विजयनगर राज्य, 1320-1565 Vijayanagar kingdom
.024 2	बहमनी राज्य, 1347-1599 Bahmani kingdom
.024 3	खानदेश और दकन के सुल्तान वंश द्वारा शासित राज्य, 1474-1699 Sultanates of Khandesh & Deccan (खानदेश, बरार, बीदर, गोलकुंडा, अहमदनगर, बीजापुर)
.025	मुग़ल वंश राज्यकाल, 1526-1707 Mogul period —इस वर्गांक के अंतर्गत मुग़लकालीन भारतीय इतिहास, संस्कृति और सभ्यता संबंधी व्यापक कृतियों का वर्गीकरण कीजिए
.025 1	बाबर, 1526-1530 Babar [इसमें प्रथम पानीपत युद्ध (1526) समाविष्ट है]
.025 2	हुमायूं, 1530-1556 Humayun
.025 3	अकबर, 1556-1605 Akbar [इसमें द्वितीय पानीपत युद्ध (1556) समाविष्ट है]
.025 4	जहांगीर, 1605-1627 Jahangir
.025 5	शाहजहां, 1627-1658 Shahjahan
.025 6	औरंगज़ेब, 1658-1707 Aurangzeb
.025 7	उत्तरकालीन मुग़ल बादशाह, 1707-1858 Later Mogul rulers [इसमें तृतीय पानीपत युद्ध (1759) समाविष्ट है]
.025 8	अवध के नवाबों का इतिहास, Nawabs of Oudh
.025 81	बंगाल के नवाब, 1700-1757 Nawabs of Bengal
.025 9	समसामयिक राजपूत इतिहास Contemporary Rajput history
.026	प्राक्ब्रिटिश मराठा इतिहास Pre-British History of the Marathas
.026 1	शिवाजी, 1627-1630 Shivaji
.026 2	पेशवा वंश,1714-1796 Peshwa dynasty
.026 3	भोंसले वंश Bhonsle dynasty
.026 4	सिंधिया वंश Scindia dynasty

As has been said earlier, similar expansions have been made in a number of places. In some cases subjects of considerable importance have been relocated also. Special mention may be made of the classes 410 and 810 which have been given to Hindi language and Hindi literature respectively. In the original edition these two classes are given to Linguistics and American literature in English. Both the new classes have also been expanded considerably to suit the requirements of Indian libraries. One thing may be pointed out that by this relocation of Hindi language and Hindi literature have inconveniently been separated from other Indian languages and literature. Along with Hindi, the Urdu language has also been shifted to 419 from its original position in 491.439, and Urdu literature to 819. This brings Hindi and Urdu to a better juxtaposition. Since the present Hindi edition is an authorised version, the above extensions naturally become authorised.

Apart from the above mentioned reduction and expansion work, perhaps, the most important work in bringing out the Hindi edition has been the translation work. Firstly, because of the all comprehensive detailed subject specification in the DDC, translation of names of subject included in the schedule is almost like creating a dictionary in another language. Secondly, it should be emphasised, translation into Hindi must have been quite a difficult task as the language of communication of any serious study is still English in India. Very appropriately, Dr Gour has taken into consideration the available Hindi glossaries of technical terms that have been prepared by various agencies. Even then a large part of the translation work must have been done by Dr Gour himself. The resulting Hindi schedule, the reviewer believes, could also be used as an important source of glossary of Hindi terms.

Some of the Hindi terms used in the schedule may appear unfamiliar and even queer. This is because many of the terms are not in general use and most of us are more familiar with their English equivalents. To cite an example, the Hindi word परिवार is quite familiar. Hence for family planning परिवार-नियोजन should be quite acceptable and this has been used by the translator. But, as will be seen in Table 1, another less familiar term, namely, कुटुंब has been used, such as, कौटुंबिक विघटन The dictionary shows this to be an equivalent term but unfortunately this is less used and less familiar to many. There are innumerable cases of this nature. It appears, at times, it is difficult to choose the best available word and use it consistently. For example two different Hindi words have been used for 'notation'. They are वर्गांक and अंकन. The first one has been used for class number also.

All these difficulties in terminology ultimately puts considerable stress on the index also, apart from other difficulties. For example, in the index there is a see reference from परिवार-नियोजन to संतति-निरोध. The compiler is aware of the use of the former term, but he has evidently forgotten of the use of संतति-निरोध, as there is no mention if it in the index. Perhaps, the classifiers would have been helped considerably if an English index could be provided.

The important consideration is that we have now a Hindi edition of DDC. Many Indian libraries will welcome it. The Indian library community will surely like to congratulate Dr Gour for his excellent work. The present editor of DDC, Mr Benjamin Custer, has expressed his view that the publication of the Hindi edition will encourage others to translate DDC into other Indian languages. Let us hope this will be possible.

The first hundred years of DDC in India has been fruitful. Let us hope the next hundred years, with the availability of a Hindi edition, will be much more fruitful.

SOME QUOTABLE QUOTES BY AND ON CUTTER AND DEWEY

Either the DDC or Cutter's Expansive Classification might have been in use in the Library of Congress. But how the destinies of both the schemes were changed has been told by W P Cutter, nephew and biographer of Charles Ammi Cutter, in the following words:

"When the Library of Congress decided to make a new classification, a committee of three (Dr Putnam, Librarian of Congress, Mr. Martel, in-charge of the classification division in the library, and myself) made an extensive trip to visit libraries using either the Decimal or the Expansive classification. We called on Mr Cutter and on Mr Dewey, and suggested to both certain changes in their classifications which seemed perhaps desirable, some of which had been suggested by librarians whom we had previously visited. Mr. Cutter expressed himself as perfectly willing to make any changes which after careful consideration seemed necessary. Mr Dewey absolutely refused to make any, basing his argument on the inconvenience which would result to the large number of libraries already using the Decimal classification.

The final decision was, of course, left to Mr Martel, and he recommended that the Expansive be taken as the basis for the new classification. Unfortunately, Mr Cutter died soon after this [September 6, 1903], and his help was not available."

* * *

Cutter's idea on the general principle of book selection is revealed in the following passage:

"We are to buy the best books ... This means tne best books for the particular library in question, and that is the same as the best books that its people will use; for an unused book is not even good. Not the best books for the librarian, nor for the book committee, nor for the self-elected book committee outside the library, nor for the shelves (to keep them warm by never leaving them); but the best books to satisfy the just demands of our clients for amusement and knowledge and mental stimulus and spiritual inspiration. The library should be a practical thing to be used, not an ideal to be admired".

* * *

Both Cutter and Dewey had first met their life partners in the Harvard library. Both of them married within the profession. The following quotations reveal this delicate side of the two great persons:

"When Chalres Cutter became Dr. Abbot's assistant in the Harvard library, he met a young woman of the library force who was to become his helpmeet for the rest of his life. This was Miss Sarah Fayerweather Appleton... They were married on May 21, 1863...."

"One of the ladies who attended the library conference in Philadelphia was Annie R Godfrey, the young librarian of Wellesley College. She had attended Vassar College through the junior year before accepting the Wellesley College. Dewey's diary of April 18, 1876, recorded their chance meeting at Harvard that day where she had listened, along with Harvard library assistants, to a talk by Dewey on the classification scheme he had devised. Her deep interest and her desire to carry on the Wellesley work successfully sent Annie Godfrey to the Philadelphia meeting and also to the meeting in London in 1877. Her marriage to Dewey took place on October, 19, 1878.

* * *

Charles Ammi Cutter had great interest in dancing and he believed he was a good dancer too. But, the following is what his biographer writes about one of his dance performances:

"No reference to Mr. Cutter's activities at the American Library Association conventions would be complete without some allusion to his dancing. He was an indefatigable devotee of the terpsichorean art, and was perhaps the most familiar figure on the ballroom floor. He was not really a very good dancer, but his enthusiasm took the place of proficiency. Once he arrived at the convention in a rough gray flannel shirt and tweed knickers, having just finished a walking trip. His luggage did not arrive, and he was forced to borrow one of my suits for the evening dance. The trousers were at least six inches too long, and were therefore turned up at the bottom in an awkward fold. The sleeves were too long, and were also turned up. But he danced every dance in this incongruous costume, and wore it every evening - for his luggage did not come at all."

There is one more reference to Cutter's performance in dancing. This time the quotation is from Immroth's article in the Encyclopedia of Library and Information Science. It reads as follows:

"While very fond of dancing, Mr Cutter was not especially good partner. It is said that at a leap year party he remained a wallflower during a good part of the evening. With his delightful gentleness, politeness, and good humor he bore his lot patiently and slyly remarked that he had made a careful note of all the ladies who had slighted him and should, when his turn came the following year, ask every one of them to dance with him".

* * *

Dewey was an ethusiastic supporter of the idea of centralised cataloguing. He expressed this in the Library Journal, meetings and conferences, and also in correspondence. But, he put it most convincingly, perhaps, before the Joint Committee on the Library of the U.S. Congress in 1896. The following is an extract from Dewey's evidence before the Committee.

"We have perhaps 4,000 public libraries in the country of 1,000 volumes or more. If a book is published that 500 of these libraries will buy, where can you think of a greater waste than that every one of the 500 should have to undertake, each for itself, with, in most cases, limited bibliographic machinery and insufficient force, to catalogue that book when it has been already catalogued in the National Library by the most expert staff in the country, having at their disposal every known resource? Printing is very cheap. Any library willing to pay the cost of paper and postage could have a copy of these cards furnished without extra expense to the Government, which has already paid for making its own cards... It would mark an era when the National Library was ready to do this incalculable service to the libraries and students of the country".

As is known, the era dawned in 1901 with the introduction of the Cataloging Distribution Service of the Library of Congress. Looking at the success of the project, Cutter wrote:

"I cannot help thinking that the golden age of Cataloging is over, and that the difficulties and discussions which have furnished an innocent pleasure to so many will interest them no more. Another lost art. But it will be all the better for the pockets of the public, or rather it will be better for other parts of the service— the children's room and the information desk, perhaps."

* * *

It may be recalled that the L C printed cards did not carry DDC numbers till 1930. In 1920s more than 80 percent of the customers subscribing to the card service were DDC libraries. This absurd situation prompted Dewey to write to Herbert Putnam, then Librarian of Congress, the following:

"100s of libraries weep and wail because DC numbers are not on your printed cards".

Commenting on this issue John P Comaromi has said recently:

"Of course, weeping and wailing are out of place in a cataloging department, nevertheless, the same title was classed thousands of times in the DDC libraries of America, and such an economic imposition did not give rise to broad smiles".

* * *

Commenting on that 'unmitigated disaster', the DDC fifteenth edition, the so-called standard edition, Comaromi has written:

"In order to understand the extent to which the numbers were cut back, let me cite the same classes in the different editions. Diseases of women and children, 618, had sixty-seven entries in the fourteenth edition. In the fifteenth edition it was labeled gynecology and obstetrics and had only two subdivisions - 618.9 pediatrics and 618.97 gerontology. Such attrition caused agitation to even the most confirmed bachelor".

On the credit side of the fifteenth edition, Comaromi has said:

"Did any good come from the fifteenth edition? Well, even the Niles flooding has its good side. The simplified spelling, that had grown increasingly atrocious, was almost shed... The format, done by Kingsport Press, was elegant for the first time. A great deal of deadwood had been eliminated... And a few areas, such as sociology, had been improved..."

* * *

Dewey was christened as Melville Louis Kossuth Dewey. But his enthusiasm for simplification and spelling reform did not spare even his own name. He found no use for the two middle names, that is, Louis and Kossuth, which he dropped without regret. He retained the first name but reformed it. Thus, he became Melvil Dewey. At one time he extended his spelling reform zeal to his surname also and started spelling his name as 'Dui'. Surely, he had friends around him who must have pointed out how atrocious the spelling was. That made him restore his name as Melvil Dewey, the form in which the name is cherished and remembered by us.

We do not know how many persons Dewey was able to convert to his idea of spelling reform in name. But one such person was surely Miss Dorkas Fellows, that 'walking encyclopedia who had all the charm of such a book'. Her original name was Jennie Dorcas Fellows. Thus, like Dewey, she not only shortened her name but reformed the spelling also.

* * *

Cutter's reference to 'a mob becoming an army' to describe the effective strength of cross references in a subject catalogue is well known and oft-quoted. Dewey also used the same analogy, and much more, to express the virtues of classification. The following passage by Dewey reveals this:

"A successful man is usually a classifier and a chartmaker. This applies as much to modern business as to science or libraries... A large business or work unclassified or uncharted is not a worthy organization but mere material from which a clever brain may construct one. It differs in efficiency from the ideal as a mob of men differs from a well disciplined army. Piles of bricks and mortar are not a temple any more than heaps of type are Shakespeare's works, though if 'classified' and set, each in right relation to the rest, the transformation is brought about".

* * *

It has been said that Dewey rearranged, at the age of five, his mother's larder in a more systematic fashion. Surely, an early revelation of a systematic mind. The frame of mind of a classificationist is often compared to that of lexicographers and encyclopedists. This was also revealed by Dewey, as a boy, as the following extract from R.S. Parkhi substantiates:

"... With his accumulation of a little over ten dollars, gradually saved, by running errands, shovelling coal and shoemaking, he walked from Adams Centre to Watertown - a distance of eleven miles, while still under fifteen to buy a book on which his heart had been set for several years and for which he had done many long hours of work: Webster's unabridged dictionary".

FOCUS ON UNISIST

This is the tenth instalment of this Feature. The items focussed are from the Unisist Newsletter 1976, vol 4 nos 2 and 3. – Ed.

FOURTH MEETING OF THE BUREAU OF THE UNISIST STEERING COMMITTEE, HERCEG NOVI, 22-23 APRIL 1976

The fourth meeting of the Bureau was held at the Center for Scientific Gathering, Herceg Novi, Yugoslavia, at the invitation of the Chairman of the Steering Committee. After adoption of the agenda, the Secretary of the Steering Committee, Mr. A. Wysocki, presented his report which concentrated on the following subjects: implementation of recent UN resolutions concerning technological information and transfer of technology; UNISIST and intergovernmental and non-governmental organizations; the Unesco general information programme; and UNISIST programme developments.

The Bureau expressed some concern that the UN resolutions, which had been designed to meet a real and urgent need, might be implemented in such a way as to duplicate existing efforts, especially in the establishment of national focal points, the creation of norms and guidelines, the running of pilot projects and the education and training of information specialists. The Bureau reiterated its viewpoint that UNISIST offers an effective conceptual and intellectual framework which should link the special information systems and services created by UN agencies in fulfilment of their specialized missions.

FIRST MEETING ON PLANNING AND IMPLEMENTING NATIONAL INFORMATION ACTIVITIES IN SCIENCE AND TECHNOLOGY

The meeting was held in Herceg Novi, Yugoslavia, from 20 to 23 April 1976. There were 26 participants and 7 advisers from 25 Member States and representatives from FAO, IAEA, UNEP and ICSU. The meeting was hosted by the Yugoslav National Commission for Unesco in collaboration with the UNISIST National Committee of Yugoslavia and organized by Unesco jointly with the International Development Research Centre (IDRC) of Canada.

The main objective of the meeting was to bring together National Focal Points in charge of developing and managing national information systems and services in science and technology, so that they may interact, exchange information based on their particular experience, transfer the know-how acquired, and obtain a better insight and understanding of the problems encountered.

The discussion was of particular use to the sponsors of international information programmes and systems in obtaining a better insight into the practical problems encountered at the national level, the forms of assistance from international funding agencies that would be most useful for the developing countries in the field of information and the role of the focal point.

The discussions in the five sessions were supported by the presentation of country reports on Brazil, Indonesia, Ireland, Poland and Spain. Experience gained in this area by Algeria, Austria, the Federal Republic of Germany, India, Peru and the Union of Soviet Socialist Republics served as a basis for discussion in several sessions.

A special brochure summarizing the results of this meeting and identifying areas of consensus or expressed during the sessions will be published before the end of 1976.

SECOND MEETING OF EXPERTS ON REGIONAL INFORMATION POLICY IN SOUTH AND CENTRAL ASIA

This meeting was held from 18 to 20 March 1976 in New Delhi. It was convened by Unesco's Regional Office of Science and Technology, New Delhi, as a follow-up of the First Meeting of Experts on Regional Information Policy Development held in Colombo in December 1974. The meeting was attended by information specialists from Afghanistan, Bangladesh, India, Iran, Mongolia, Nepal and Sri Lanka. In addition, representatives from UN, UNDP, ILO, UNADI and from governmental institutions concerned with scientific and technical information and documentation participated in the meeting.

The aims of the meeting were to highlight major issues involving the planning of scientific and technical information systems, to review and assess the existing information and documentation facilities and requirements through preparation of national inventories and regional surveys, to consider general policy and programmes for the education and training of information specialists, to develop mechanisms for the improvement of access to primary and secondary information sources, as well as to consider the feasibility of establishing a permanent information policy committee in the region.

REGIONAL SEMINAR ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL INFORMATION SERVICES

A Regional Seminar on Scientific, Technical and Industrial Information Services in South and Central Asia was held from 22 to 26 March 1976 in New Delhi. It was organized jointly by the Indian National Scientific Documentation Centre (INSDOC) and the Documentation Research and Training Centre (DRTC), Bangalore, and was sponsored by Unesco, under the UNISIST Programme. Delegates from Afghanistan, Bangladesh, India, Iran, Mongolia, Nepal and Sri Lanka participated in the Seminar.

The two main items of discussion were:

National information infrastructure including the following topics: status of development in the countries concerned, identification of national information requirements, steps in the preparation of a plan for a national information system, structure of a national information system, programmes and activities in the development of a national information infrastructure, and impact of international information systems and programmes on national systems;

Regional cooperation in the information field including the following topics: general regional programmes, bilateral cooperative programmes, and cooperation under the sponsorship of international agencies.

The seminar adopted a number of recommendations for the promotion of regional cooperative projects, programmes and activities in the information field and for the support of regional training programmes, and the use and operation of computerized data bases in the region.

GUIDELINES FOR THE EVALUATION OF INFORMATION SYSTEMS AND SERVICES

In response to widespread interest, UNISIST has arranged with Professor W.F. Lancaster of the Graduate School of Library Science, University of Illinois, a specialist in information storage and retrieval and in the evaluation of information systems, to prepare guidelines for the evaluation of information systems and services.

A tentative outline for this publication includes the following items: role of information centres in the total information transfer cycle; range of services and activities provided by information centres; purpose of evaluations applied to information services; levels of evaluation: effectiveness evaluation, cost-effectiveness evaluation, cost-benefit evaluation; evaluation criteria for various types of information service and activity; steps involved in the conduct of an evaluation programme; specific evaluation methodologies applicable to various types of information service; special problems of evaluation, including application to national systems, international systems and the evaluation of services in developing countries.

The guidelines will be designed to serve as a practical guide in evaluation at both the national and international levels and will include a complete bibliography. It is hoped that the final version will appear in 1977.

UNISIST AD HOC COMMITTEE ON EDUCATION AND TRAINING

The UNISIST Ad Hoc Committee on Education and Training Policy and Programme held its second session 19-21 May 1976 at Unesco House, Paris.

There were four main items on the agenda for which the invited experts presented background papers:

1. Comparative Analysis of Evaluation Reports on UNISIST Short Courses

Professor Saunders presented a comparative analysis of six of the UNISIST short courses held to date (Poland, Japan, United Kingdom, Mexico, Spain, USSR) for each of which evaluation reports had been prepared. All courses had revealed considerable benefits and some shortcomings and their analysis had yielded a number of positive conclusions. For future courses it was agreed that uniform, high-quality evaluation was desirable.

2. Assessment of Manpower Needs and Implementation of Manpower Surveys

When introducing this paper, Mr. Sweeney put the case for an overall strategy of manpower development. This strategy should form part of a national plan for scientific and technical information, which would have social and economic objectives and would indicate the services that were needed. A manpower survey should attempt to discover the requirements of the plan both now and in the future since in planning recruitment, career structure and career opportunities one was essentially making long-term decisions.

Regarding topic No. 3. Curriculum Development in Information Studies, the Committee concerned itself primarily with what Unesco might do, through its UNISIST programme, to help institutions in Member States develop curricula for basic courses. It agreed that the main function was to extract and pass on valuable experience gained from courses already operating and in process of evaluation. For this purpose it favoured constructing a set of guidelines which would include a structured checklist of possible curriculum subjects, including information practice as well as information science and preferably organized in modules in relation to functions. These guidelines could also include a strategy for developing curricula for regional courses.

Item 4 of the Agenda on the Harmonization of Education and Training Activities included:

(a) the problem of comparability of degrees in information science, which was found to be a most difficult and complex problem;

(b) pilot project on clearing system for the European Community. The Committee noted with satisfaction the Chairman's interim report on the pilot project and suggested to obtain details of comparable projects in other countries; and

(c) feasibility study on a newsletter on training and education programmes in the field of documentation and information. Mr. Wersig reported on a survey of 212 newsletters covering various aspects of documentation and information. None of these dealt with problems of education and training on an international scale.

The Committee felt that it would be worthwhile trying the publication of such a newsletter for an experimental period and then evaluating on the basis of user's reactions.

As of follow-up of the meeting, the following three guidelines have been commissioned in accordance with the directives received:

(a) Guidelines on curriculum development in information studies,

(b) Methodology for information manpower forecasting, and

(c) Policy for information manpower development (UNISIST proposals).

UNISIST AND SOCIAL SCIENCES

The existing national focal points and UNISIST national committees established for the planning and co-ordination of national information activities relating to scientific and technological information should, where possible, also be used for purposes of social science information. For this purpose, and as one of the first steps towards the inclusion of the social sciences in the UNISIST programme, the Director-General of Unesco addressed a circular letter (CL/2517) to Member States at the beginning of July 1976 to invite their government to take any steps to enlarge the UNISIST National Committee, if such a committee has been created, in order to ensure adequate representation of the social sciences, or to designate a suitable national centre to serve as the focal point for social science information. A national focal point for social science information should preferably be a body able to guide, stimulate, coordinate and operate in the development of social science information resources and services in the perspective of national, regional and international co-operation.

It is hoped that the governments will shortly find ways and means to complete their own national setup in the field of scientific and technological information so that the latter can participate to the fullest extent possible in the activities of the UNISIST programme.

INTERNATIONAL DIRECTORY OF ON-GOING RESEARCH INFORMATION SYSTEMS AND SERVICES

As a result of the "International Symposium on Information Systems and Services in On-going Research in Science" held in October 1975 and co-sponsored by Unesco/UNISIST and the Smithsonian Science Information Exchange (SSIE), there was a concensus on the need to create an international directory to encourage development in this field and to serve as a referral source.

The directory is to be published by SSIE, with the support of the National Science Foundation of the United States, by mid-1977. It will be edited in collaboration with UNISIST which will also distribute a limited number of copies to participating systems.

The directory will include separate entries describing responding operational systems, a list of systems planned or under development and an extensive set of indexes. An additional aspect will be an introductory state-of-the-art reivew based on analysis of data submitted by the systems.

BOOK REVIEW

Terminology of documentation: a selection of 1200 basic terms published in English, French, German, Russian and Spanish, compiled by Gernot Wersig and Ulrich Neveling. Paris, Unesco Press, 1976 274p. ISBN 92-3-001232-7. [Reviewed by B Guha]

That there has been a real need for such a compilation requires hardly any emphasis. The main objective of such a work would be to help standardize basic terminology in the rapidly developing field of documentation and thus promote international co-operation. A very important initiative in this field was taken by Anthony Thompson, of the Vocabularium Bibliothecarii fame, who presented a first draft of a Vocabularium Documentationis to the FID conference at Scheveningen in 1962. Attempts were made thereafter to revise this compilation through subsequent drafts. However, the documentation scene changed faster than these revisions. The present compilation has been prepared by the German Society for Documentation under a Unesco contract concluded in 1970.

The selected 1200 terms have been presented under five broad groups, namely, Basic aspects of information and documentation, Documents, Activities in information and documentation, Systems of information and documentation, and Organizations and professions in information and documentation. Each group is divided into several sub-groups. Entries under each ultimate sub-groups are arranged alphabetically by the English names. Under each term the equivalent French, German, Russian, and Spanish terms are given. The definitions or meaning of each term is given in English only. References are also given by way of BT, NT, OT and RT. Thus, a conceptual mapping of the terms in different sections, in the overall context of documentation, is also available. The Russian terms have been added by the All-Union Institute for Scientific and Technical Information (VINITI) and the equivalent Spanish have come from the Director of the Centro de Informacion Cientifica y Humanistica, Universidad de Mexico.

The main part of the compilation is supported by five alphabetical indexes in English, French, German, Russian, and Spanish There is also a UDC index. In the definition of the terms, efforts have been made to bring out the meaning in a very concise form. To make this possible, terms which have already been defined in the compilation has been used. For example, the term Chain has been defined as: A 'hierarchy of classes' of decreasing extension and increasing intension derived by successive subdivision. In this definition, the term quoted within ' 'has been defined in the same group, while the two terms in italics have been defined elsewhere in the vocabulary. Thus, in defining the term chain, three other terms have been used which are also defined in the vocabulary.

The above practice, it may be pointed out, is likely to oblige the reader to chase a few more definitions before he gets the correct and complete meaning of a sought term. In the above example he may have to look at three more places. However, the compilers believe that this practice has enabled them to 'standardize definitions to a maximum degree' and present the meanings in concise form.

The method of presentation is certainly important in a compilation of this type and that is why the above points have been brought out. But that is not all. One would naturallly like to know how well the terms have been defined — are they authentic and dependable? In most cases the definitions are authentic and should be quite useful. But a few words need be said about a group of terms, specially in the field of classification, which have been brought into use by the Indian school. Let us take two terms — attribute and characteristic, given in the group 12 - Concepts. Attribute has been defined as – A 'characteristic' of an 'element'. While the term characteristic has been defined as — Any of the properties that constitute a 'concept'. Surely, the distinction between them has not been brought out very clearly. The sense in which the terms are used by librarians who are familiar with the Indian school of thought is different. The Prolegomena definitions are as follows:

Attribute — any property or quality or quantitative measure of an entity.

Characteristic — an attribute or any attribute-complex with reference to which the likeness or unlikeness of entities can be determined and at least two of them are unlike.

From the above definitions it would be clear that the meaning given to the terms in the present compilation is completely distorted and wrong. A number of similar cases can be pointed out. At this point the present reviewer is reminded of a warning by Samuel Butler, who said, "Definitions are a kind of scratching, and generally leave a sore place more sore than it was before". So, instead of scratching further, it may be pointed out that some of the Indian sources ought to have been considered by the compilers.

In fact looking down the 'English sources' listed in the Bibliography (p. 48-49) one is surprised to see the omission of two glossaries, on cataloguing and classification, brought out by the Indian Standards Institution, and also the Prolegomena and other sources. Incidentally, the only Indian source that has been mentioned is a paper by the present reviewer published in the same journal (item B13). Unfortunately, the names of this autho: and his co-author have been spelled wrongly and the title of the journal has been wrongly mentioned as Annual. Three mistakes in a single entry have made the item pretty difficult to be recognised. A serious typographical error occurs in page 178, where 'lending library' has been wrongly spelt.

However, the above are a few minor blemishes only. In spite of them the compilation will be a useful reference tool for all information workers.

Index to Current Urban Documents, ea by A L Fessler, Vol. 1(1/2), New York, Greenwood Press, 1972. Quarterly. $ 75.00 per annum [Reviewed by Surender Mohan]

Government publications at all levels have become a major information resource in almost every field of human knowledge and endeavour. But not many attempts have been made to have regular bibliographic control in the field of governmental publications, nor have governmental publications played so far any important part in research. The 'Index to Current Urban Documents' is a well-thought out venture that purports to close a major bibliographic gap in the field of government publications by making available, for the first time, complete and detailed bibliographic descriptions of a large majority of official documents being issued every year by the larger cities and counties in the United States. The aim of the compilers is to catalogue and index documents issued by 154 cities having a population of 100,000 or more and 24 counties having one million or more inhabitants as determined by the 1970 census. It covers documents issued by government departments at all levels (state, provincial and federal) relating specifically to those cities and counties, as well as documents published or sponsored by such agencies as authorities, special districts and regional councils. It is intended as a vehicle for preserving and disseminating information on the current urban scene as reflected in the official reports published by agencies of government that make and execute decisions, and create the conditions under which most American and Canadians live.

In contrast to the existing bibliographic control of federal and state government publications in which municipal documents have gone largely unrecorded, the present 'Index' by including these also in its scope has made known to students, scholars, urban affair specialists, and interested citizens about the existence of one more valuable information source which augments the purposes served by municipal reference libraries. In selecting documents for inclusion in the 'Index to Current Urban Documents', emphasis has been given to those which are concerned with public affairs, i.e. social, political, economics and public administration matters. Serials published by city departments and agencies are cited annually.

The 'Index' is divided into two parts: 1) an author list, and 2) a subject index. Citations in the author list are arranged alphabetically under place name (city or county) accompanied by name of issuing department and title thereafter. These entries are followed by listing of documents pertaining to those cities or counties and published by authorities, special districts, regional councils, states and finally the federal government. Each document is cited fully. Each document in the author list carries, two numbers on the top line of the entry: to the left, the Index indentification number; to the right, the microfiche ordering number. The annual cumulative index will contain a new sequence of numbers, since entries from the quarterly issues will be merged alphabetically at the end of the year. Microfiche Collection number is given to enable microfiche ordering.

The subject index is based on an Urban Documents Thesaurus developed by the editorial staff for the Index.

Entries in the subject index contain either shortened titles or descriptors and refer to the full entry in the author list via the Index identification number. Documents may thus be located either directly in the author list, if the users interest relates primarily to a given city or county or by consulting the subject index, if his interest is in a specific subject area without regard to geographic boundaries.

The Index is a landmark in the history of bibliographical control of Urban Government Publication and would be very much welcome by librarians, documentalists, research workers in the field of social sciences and public administrations and all those having anything to do with governmental departments.

INDIAN NATIONAL SCIENTIFIC DOCUMENTATION CENTRE

The Centre has been established by the Government of India with the help of UNESCO to serve as a vehicle for the procurement, exchange, and dissemination of scientific information required by the Indian scientist engaged in research and development. Its operation has been entrusted to the Council of Scientific and Industrial Research.

INSDOC SERVICES

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contents

EDITORIAL
HUNDRED YEARS OF CUTTER'S RULES AND DEWEY DECIMAL CLASSIFICATION 251-55

GUHA (B)
A Twentieth Century Assessment of Cutter's Code 256-61

SEN (Subir Kumar)
Looking Back to Dewey's Notation After Hundred Years 262-69

RAJAN (T N)
Dewey's Relativ Index - a Precursor to Thesaurofacet 270-74

GUHA (B)
The First Edition and all the Eighteen Editions - a Review 275-80

GUHA (B)
Dewey Decimal Classification in Hindi 281-84

SOME QUOTABLE QUOTES BY AND ON CUTTER AND DEWEY 285-87

FOCUS ON UNISIST 288-90

BOOK REVIEW 291-92

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